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CONTENTS

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PSYCHOLOGICAL REVIEW COMPANY
PRINCETON, N. J.

Vol. 25, No. 3 March, 1928

THE PSYCHOLOGICAL BULLETIN

PROCEEDINGS OF THE THIRTY-SIXTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, INCORPORATED, COLUMBUS, OHIO, DECEMBER 28, 29, 30, 1927.

REPORT OF THE SECRETARY, SAMUEL W. FERNBERGER, UNIVERSITY OF PENNSYLVANIA

The American Psychological Association, Inc., held its Thirty-sixth Annual Meeting at Ohio State University, Columbus, Ohio, on Wednesday, Thursday, and Friday, December 28, 29, and 30, 1927. Four hundred and eighty-nine persons registered, ninety more than were in attendance at the Philadelphia meeting last year, which up to that time was the record attendance. This registration was further remarkable with regard to the wide geographical distribution represented by those attending. An analysis of the registration by states and foreign countries is as follows: Ohio, 119; New York, 58; Illinois, 49; Pennsylvania, 27; Michigan, 22; Minnesota, 17; New Jersey, 15; Massachusetts, 12; Connecticut, 11; Indiana, 10; Iowa, 10; California, 9; Wisconsin, 9; District of Columbia, 7; Missouri, 7; Kansas, 6; Maryland, 6; 4 each from Florida, Kentucky, North Carolina, Texas; 3 each from Oklahoma and West Virginia; 2 each from Canada, Colorado, Georgia, New Hampshire, Tennessee, Vermont; 1 each from China, England, Germany, Holland, Maine, Norway, Rhode Island, South Africa, South Dakota, Utah, Virginia, and Washington. In all, thirty-five states and six foreign countries were represented.

The program consisted of nine formal sessions in which sixty-four papers were presented by members and associates and two sessions at which twenty-one papers were presented by graduate students, the Annual Dinner followed by the Presidential Address,

two round table conferences in experimental psychology with Mr. Weiss as Chairman, one round table conference on the Analysis of Mental Traits with Mr. Kelley, Chairman, and Professor Spearman in attendance. Exclusive of the informal reports by graduate students, the sixty-four papers were classified by the Program Committee as follows: experimental psychology, fourteen; clinical psychology and mental measurement, thirteen; vocational psychology, nine; general psychology, seven; educational psychology, seven; animal and comparative psychology, seven; social and abnormal psychology, six.

The Annual Dinner was held on Thursday evening with an attendance of approximately two hundred and fifty people. Following the dinner, the Presidential Address, "Sensuous Determinants of Psychological Attitudes," was given by H. L. Hollingworth. All of the meetings and conferences were well attended.

Apparatus was exhibited by a number of members and by the C. H. Stoelting Company.

A meeting of the Council of Directors was called at 10 o'clock on Tuesday morning, December 27, and was adjourned at 11 P.M. that same evening.

Transactions of the Annual Business Meeting

Due notice having been given, the annual business meeting of the American Psychological Association, Inc., was held on December 29, 1927, in Room 321, Education Building, Ohio State University, Columbus, Ohio, at 8:10 o'clock with President H. L. Hollingworth in the chair.

Upon motion duly made and seconded, it was voted that the minutes of the Thirty-fifth Annual Meeting at Philadelphia, Pennsylvania, be approved as printed.

The Secretary announced the deaths of Henry Rutgers Marshall on May 2, age seventy-five years, and Melbourne S. Read. The Secretary announced the resignations during the year of 1927 of C. G. Bradford, Nicholas Murray Butler, George A. Coe, John Dewey, Walter G. Everett, Raymond H. Franzen, George B. Germann, A. L. Jones, and Woodbridge Riley.

The Treasurer's report as printed on page 134 was read and approved by vote of the Association.

On the recommendation of the Council of Directors, it was voted to elect the twenty-nine persons named below as members of the Association.

List of Members

1. Anderson, Rose Gustava, Ph.D., 1925, Columbia University,
   Psychologist, Minneapolis Child Guidance Clinic.
2. Brotemarkle, Robert A., Ph.D., 1923, University of Pennsylvania,
   Assistant Professor of Psychology, University of Pennsylvania.
3. Cowdery, Karl Montague, Ph.D., 1926, Stanford University,
   Asst. Registrar and in charge of Personnel Research, Stanford University.
4. Dickinson, Charles Alexius, Ph.D., 1925, Clark University,
   Professor of Psychology and Head of Dept., University of Maine.
5. Diserens, Charles Murdoch, Ph.D., 1922, University of Cincinnati,
   Assistant Professor of Psychology, University of Cincinnati.
6. Dorcus, Roy Melvin, Ph.D., 1925, Johns Hopkins University,
   Instructor in Psychology, Johns Hopkins University.
7. Fenton, Norman, Ph.D., 1925, Stanford University,
   Associate Professor of Psychology, Ohio University.
8. Furfey, Paul Hanly, Ph.D., 1926, Catholic University,
   Instructor, Catholic University.
9. Guilford, Joy Paul, Ph.D., 1927, Cornell University,
   Instructor in Psychology, University of Illinois.
10. Hildreth, Gertrude, Ph.D., 1925, Columbia University,
    Associate in Educational Psychology, Columbia University.
11. Hirsch, Nathaniel D. Nittron Hirsch, Ph.D., 1924, Harvard University,
    Research Fellow, National Council on Religion in Higher Education.
12. Jones, Mrs. Mary Cover, Ph.D., 1926, Columbia University,
    Laura Spelman Research Fellowship in Child Development, Teachers College.
13. Jones, Vernon A., Ph.D., 1926 Columbia University,
    Associate Professor of Educational Psychology, Clark University.
14. Josey, Charles Conant, Ph.D., 1921, Columbia University,
    Professor of Philosophy, University of South Dakota.
15. Koffka, Kurt,
    Professor of Psychology, Smith College.
16. Lanier, Lyle Hicks, Ph.D., 1926, George Peabody College,
    Instructor in Psychology, New York University.
17. Meier, Norman Charles, Ph.D., 1926, University of Iowa,
    Associate, Psychology, University of Iowa.
18. Meltzer, Herman, Ph.D., 1925, Columbia University,
    Instructor, Psychology, Oregon State College.
19. Miles, Catharine Morris Cox, Ph.D., 1925, Stanford University,
    Research Associate in Dept. of Psychology, Stanford University.
20. Nafe, John Paul, Ph.D., 1924, Cornell University,
    Associate Professor of Psychology, Clark University.

21. Rexroad, Carl N., Ph.D., 1924, Yale University, Stephens College.
22. Riddle, Ethel M., Ph.D., 1925, Columbia University, Psychologist, Community School and John Burroughs School, St. Louis.
23. Shen, Eugene, Ph.D., 1926, Stanford University, Secretary, China Institute in America.
24. Taylor, W. S., Ph.D., 1921, Harvard University, Professor of Psychology, Smith College.
25. Travis, Roland Charles, Ph.D., 1926, State University of Iowa, Research Fellowship in Biological Sciences, National Research Council.
26. Wellman, Beth, Ph.D., 1925, State University of Iowa, Research Assistant Professor, Iowa Child Welfare Research Station.
27. Wyman, Jennie Benson, Ph.D., 1924, Stanford University, The University of British Columbia.
28. Young, Paul Campbell, Ph.D., 1923, Harvard University, Assistant Professor of Psychology, Louisiana State University.
29. Syz, Hans C., M.D., 1920, University of Geneva, Instructor in Psychiatry, Johns Hopkins University.

On the recommendation of the Council of Directors, it was voted that the eighty-four persons whose names were presented by the Council for election as Associates, be elected as Associates. Their names appear below.

List of Associates

1. Luton Ackerson
2. Phyllis Bartelme
3. Mildred Frances Baxter
4. Nancy Bayley
5. John G. Beebe-Center
6. John Edward Bentley
7. Hugh Carlton Blodgett
8. Lenoir Henderson Burnside
9. Vernon Mosher Cady
10. Othniel R. Chambers
11. Edward Lester Clark
12. Lawrence E. Cole
13. Leland Whitney Crafts
14. Sumner Lee Crawley
15. Alfred G. Dietze
16. Constance E. Dowd
17. Charles Arthur Drake
18. Helen Elizabeth Eagleson
19. Carl I. Erickson
20. Esther C. Flexner
21. Margaret Frank
22. Samuel Petty Franklin
23. George Horace Gallup
24. Sayde Lillian Harwick
25. Herman Hausheer
26. Ella Bolton Osbourn Heim
27. Omar C. Held
28. Elmer Dumond Hinckley
29. Frazer Hood
30. Wilbur Schofield Hulin
31. Robert Bines Woodward Hutt
32. Thomas Nicholas Jenkins
33. Eleanor Hope Johnson
34. Ethel Kawin
35. Chalice M. Kelly
36. Cora Beale Key
37. Howard L. Kingsley
38. Herbert Reynolds Laslett

39. Ellen Mathews
40. Kathryn McHale
41. Laurence Spurgeon McLeod
42. Glenn Newton Merry
43. Margaret Miller
44. Marion Monroe
45. Henry Alexander Murray, Jr.
46. Inez May Neterer
47. Oliver Arthur Ohmann
48. William Abbott Owens
49. Frances Janet Perkins
50. Erving Newton Peterson
51. Lorine Livingston Pruette
52. Ernest Adolphus Rayner
53. Catherine Haskell Read
54. Earl S. Rudisill
55. Elizabeth Jane Rutherford
56. Herbert Leon Searles
57. Frank Kayley Shuttleworth
58. Clarence Simon
59. Eleanore Douglas Singer
60. Harley Clay Skinner
61. William Ernest A. Slaght
62. John Slawson
63. Louise Littig Sloan
64. Paul C. Squires
65. Anna Spiesman Starr
66. Minnie Louise Steckel
67. Isabel Clarissa Stewart
68. George D. Stoddard
69. Charles Leonard Stone
70. Gladys Griffith Tallman
71. Thelma Gwinn Thurstone
72. Simon H. Tulchin
73. Wayland F. Vaughan
74. Isabel King Wallace
75. Margaret M. Wasson
76. Clara Beatrice Weimer
77. Paul Vining West
78. Ernest Glen Wever
79. Marion Louise Williams
80. Glentworth M. Willson
81. John E. Winter
82. Dean Amory Worcester
83. Myrtle Raymaker Worthington
84. Karl E. Zener

On the recommendation of the Council of Directors, it was voted to accept the report of the Business Manager of the Psychological Review Publications and that it be filed by the Secretary.

On the recommendation of the Council of Directors, it was voted that a committee composed of the editor of the Psychological Abstracts, the Business Manager of the Psychological Review Publications, and the outgoing President be appointed to approach the Laura Spelman Rockefeller Memorial with a view to increasing their subvention for the Psychological Abstracts.

On the recommendation of the Council of Directors and after considerable discussion, it was voted that the editors of the Psychological Review Publications be constituted a committee to consider the formulation of plans for discontinuing the Psychological Index after Number Thirty-four, and it was further voted that this committee have power to act.

The announcement of the resignation of Mr. Franz as editor of the Psychological Monographs was made, and the announcement was also made of the appointment of Mr. Raymond Dodge as editor of the Psychological Monographs vice Mr. Franz, resigned.

On the recommendation of the Council of Directors, it was voted

that the report of the Committee on Publicity for the Abstract Journal be accepted, filed with the Secretary, and the Committee be discharged with thanks, and further that a letter of thanks be sent to the J. Walter Thompson Company for their gratuitous services in the matter of outlining a publicity campaign for the Psychological Abstracts.

The report of the Committee on the Election of Officers was then presented as follows:

President for 1928: Edwin G. Boring, Harvard University.
Directors, 1928–30: Floyd H. Allport, Syracuse University, and Karl M. Dallenbach, Cornell University.
Nominees for appointment to the Division of Anthropology and Psychology of the National Research Council: Harvey A. Carr, University of Chicago, and H. L. Hollingworth, Columbia University.
Representative on the Social Science Research Council: Henry T. Moore, Skidmore College.

On the recommendation of the Council of Directors, it was voted to elect E. S. Robinson of Yale University, Treasurer for the term 1928–30.

On the recommendation of the Council of Directors, it was voted to elect the following representatives of the American Psychological Association, Inc., on the Council of the American Association for the Advancement of Science: W. V. Bingham, Personnel Research Federation, and R. M. Ogden, Cornell University.

On the recommendation of the Council of Directors, it was voted that the report of the Committee on Precautions in Animal Experimentation be accepted and its provisions adopted, including an appropriation of fifty dollars ($50) to enable the Committee to put into effect certain proposals embodied in the report. It was further voted that the Committee be continued and the report filed with the Secretary.

On the recommendation of the Council of Directors, it was voted that the report of the Program Committee be accepted and filed with the Secretary. The Program Committee for 1928 was announced as follows: H. L. Hollingworth, Chairman, E. S. Robinson, and the Secretary.

On the recommendation of the Council of Directors, it was voted that an item of fifty dollars ($50) be budgeted for the expenses of the Program Committee.

On the recommendation of the Council of Directors, it was voted that the report of the Committee on Handbooks in Psychology be accepted, filed with the Secretary, and that the Committee be continued.

On the recommendation of the Council of Directors, it was voted that the Council of Directors of the American Psychological Association, Inc., be empowered to authorize the Committee on Handbooks in Psychology to proceed with such plans of publication which the Council shall approve, providing no expense to the Association are incurred.

On the recommendation of the Council of Directors, it was voted that the report of the standing Committee on Certification of Consulting Psychologists be accepted and filed with the Secretary.

The Council of Directors unanimously recommended that the report of the Committee on Certification Policy be accepted, filed with the Secretary, and the Committee discharged with thanks. The Council of Directors also unanimously recommended "that Article XI of the By-laws be deleted entirely; that the standing committee on the Certification of Consulting Psychologists and the Treasurer of the American Psychological Association, Inc., be instructed to return certification fees to those members already certified, upon the surrender of outstanding certificates. It was further recommended that Articles XII, XIII, and XIV of the By-laws be renumbered Articles XI, XII, XIII; that Section 5 of Article VII be deleted, and that Section 6 of Article VII be renumbered Section 5." After considerable discussion, Mr. Miner presented a substitute motion "that this Association desires some form of certification for consulting psychologists among its members." Mr. Mitchell proposed an amendment to Mr. Miner's motion which read, "that the recommendation of the Council and the report of the Committee on Certification Policy be laid on the table and that for a period of at least three years, Article XI and Section 5 of Article VII be null and void." This amendment was not accepted by Mr. Miner. Mr. Miner's motion was then voted upon and lost. Mr. Hunter then proposed a substitute motion, "that the Association does desire to certify as consulting psychologists individuals outside of the Association." This motion was lost. The recommendation of the Council of Directors was then voted upon with a show of hands and was carried by a vote of seventy-three to twenty, more than the two-thirds required to amend the By-laws. The carrying of this motion has the effect of

completely eliminating all certification of consulting psychologists by the American Psychological Association, Inc.

The Council of Directors recommended the appointment of a Committee of three members of the Clinical Section to be appointed by the incoming President to offer the services of the American Psychological Association, Inc., to State Civil Service Boards and other similar bodies for the purpose of establishing more effective standards for psychometrists. This service would presumably include descriptions of the qualifications for various types of psychometric work and suggestions regarding examination procedures. After considerable discussion Mr. Miner moved that the recommendation of the Council be laid on the table, which motion was seconded and passed.

On the recommendation of the Council of Directors, it was voted that the report of the Committee appointed to present a plan of the Congress which has been printed under the title of Regulations for the Conduct of the Ninth International Congress of Psychology to be held in the United States in the year 1929, be adopted, printed in the Proceedings (page 136), and that the elections thereby be ratified. The following election of Officers and National Committee of the International Congress was then announced.

Officers and Members of the National Committee of the Ninth International Congress of Psychology

President: James McKeen Cattell, Psychological Corporation, New York City.
Vice-President: James R. Angell, Yale University.
Secretary: Edwin G. Boring, Harvard University.
Members of the National Committee:
John E. Anderson, University of Minnesota
James R. Angell, Yale University
Edwin G. Boring, Harvard University
Harvey A. Carr, University of Chicago
James McK. Cattell, New York City
Raymond Dodge, Yale University
Knight Dunlap, Johns Hopkins University
Samuel W. Fernberger, University of Pennsylvania
Walter S. Hunter, Clark University
Herbert S. Langfeld, Princeton University
William McDougall, Duke University
Carl E. Seashore, University of Iowa
Lewis M. Terman, Stanford University
Edward L. Thorndike, Teachers College, Columbia University
Howard C. Warren, Princeton University

Margaret F. Washburn, Vassar College
Robert S. Woodworth, Columbia University
Robert M. Yerkes, Yale University.

On the recommendation of the Council of Directors, it was voted that the report of the Interim Committee on Ways and Means of the Ninth International Congress be accepted, filed with the Secretary, and that the Committee turn over such materials as may be in their possession to the National Committee of the Ninth International Congress, and that the Committee be discharged with thanks.

On the recommendation of the Council of Directors, it was voted that the American Psychological Association, Inc., appropriate the sum of one thousand dollars ($1,000) to the National Committee of the Ninth International Congress to be expended in connection with the administration of the Ninth International Congress of Psychology.

On the recommendation of the Council of Directors, it was voted that the American Psychological Association, Inc., accept the invitation of Columbia University to hold the Thirty-seventh Annual Meeting in New York City on Thursday, Friday, and Saturday, December 27, 28, and 29, 1928, and that Henry E. Garrett be designated as local representative and member of the Executive Committee.

On the recommendation of the Council of Directors, it was voted that the American Psychological Association, Inc., accept the invitation of the Encylopaedia of the Social Sciences, that Miss Washburn and Mrs. G. S. Gates be confirmed as representatives for the ensuing year, and that the sum of twenty-five dollars ($25) be appropriated for traveling expenses of these representatives. The President subsequently appointed Mr. M. A. May as delegate vice Mr. Floyd H. Allport, resigned.

On the recommendation of the Council of Directors, it was unanimously voted to amend the third sentence in Section 8 of Article I of the By-laws by substituting the clause "who have had at least one full year of graduate work in psychology in a recognized graduate school and who at the time of application are devoting full time to professional or graduate work in psychology," for the phrase, "devoting full time to professional work." The sentence as amended reads, "Associates shall be persons who have had at least one full year of graduate work in psychology in a recognized graduate school and who at the time of application are devoting full time to professional or graduate work that is primarily psychological; or be persons with the degree of doctor of philosophy, based in part upon

a psychological dissertation and conferred by a graduate school of recognized standing; or be scientists, educators, or other distinguished persons whom the Council of Directors may recommend from sufficient reason."

The Treasurer presented the estimate of resources and the budget for 1928 as printed on page 135.

On the recommendation of the Council of Directors, the budget was adopted.

Upon motion duly made and seconded, it was voted to thank Ohio State University for its generous hospitality and the many courtesies extended during the meetings, and to thank Professor Burtt and the Local Committee for the excellent manner in which all arrangements were carried out.

The meeting adjourned at 10:57 P.M.

AMERICAN PSYCHOLOGICAL ASSOCIATION, INCORPORATED
REPORT OF THE TREASURER FOR THE YEAR 1927

Dr.

To Balance from previous year	$2,210.54	
Dues received from members	9,516.15	
Sale of monographs	8.57	
Sale of programs	20.75	
Interest	45.84	
Total		$11,801.85

Cr.

To Printing and supplies	$261.24	
Postage and express	228.44	
Reprints	69.44	
Yearbooks	305.25	
Programs	206.87	
Treasurer's bond	10.50	
Third payment on Psychological Review Publications	1,000.00	
Interest on notes, Psychological Review Publications	226.11	
Exchange	25.30	
Secretary's stipend	1,000.00	
Treasurer's stipend	100.00	
Subscriptions to Abstract Journal	1,782.00	
Expenses, Certification Committee	54.53	
Expenses, Handbook Committee	38.62	
Expenses, Committees on Ninth International Congress	136.30	
Total		5,444.60
Balance on hand		$6,357.25

Account of Certification Committee

Dr.

To Balance from previous year	$496.73

Cr.

To Clerical help	6.00
Balance on hand	$490.73

Account of Promotion of Abstract Journal

Dr.

To Balance from previous year	$ .71	
Total		$ .71

Cr.

To Refund to Laura Spelman Rockefeller Memorial	$ .71	
Total		.71
Balance on hand		$ .00

New Haven, Connecticut
December 15, 1927

Edward S. Robinson,
Treasurer

Audited and found correct by
Joseph Peterson and
W. S. Miles

American Psychological Association
Budget for 1928

Printing and supplies	$400.00
Postage and express	300.00
Reprints	100.00
Year Book	400.00
Proceedings (Abstracts)	250.00
Incidentals, 1927 meeting	60.00
Apparatus exhibit	50.00
Treasurer's bond	10.00
Payment on Review Publications	500.00
Interest on notes, Review Publications, 1928	175.00
Expenses, representatives on Encyclopedia of Social Sciences	25.00
Program Committee, traveling expenses	40.00
Committee on Hand Books	100.00
Committee on Animal Experimentation	50.00
Subscription to Psychological Abstracts	2,100.00
International Congress	1,000.00
Secretary's stipend	1,000.00
Treasurer's stipend	100.00
	$6,660.00

Regulations for the Conduct of the Ninth International Congress of Psychology to be Held in the United States in the Year 1929[1]

I. National Committee

The control of the arrangements for and conduct of the Ninth International Congress shall reside in a National Committee of twenty-one persons, fifteen of whom shall be elected by mail ballot under the auspices of the American Psychological Association as hereinafter described, three of whom shall be the President, Vice-President, and Secretary of the Congress, elected as hereinafter described, and three of whom shall be selected by the National Committee to be ex-officio members as hereinafter described. Final responsibility for the conduct of the Congress and the arrangements therefor shall reside in the National Committee, which may be requested by the American Psychological Association to report, but which must clearly realize that the responsibility for the Congress devolves upon its shoulders.

II. Election of National Committee and Officers

1. The Council of Directors of the American Psychological Association shall cause to be issued prior to the 1927 meeting of the American Psychological Association if possible, otherwise immediately after that meeting, a preliminary nominating ballot, which shall be mailed to all Members and Associates of the Association. This ballot shall call for two nominations for the position of President and one for the position of Secretary of the Conference, it being understood that on the final or election ballot, the person receiving the highest number of votes shall be President and the next highest Vice-President. This ballot shall also contain fifteen blank spaces, upon which those circularized will be requested to place the names of those whom they wish to nominate for the National Committee.

2. An election committee composed of the five most recent ex-presidents of the American Psychological Association, with the most recently retired President as Chairman, shall count the ballots thirty days after they are sent out by the Council of the Association.

3. Upon receipt of the report on the results of the nominating ballot from the election committee, the Council of Directors of the American Psychological Association shall issue an election ballot to all to whom the nominating ballot was sent, upon which shall be printed the names in alphabetical order of the six persons receiving the highest vote for President in the nominating ballot and the names in alphabetical order of the three persons receiving the highest vote for Secretary, requesting those to whom the ballot is sent to indicate by appropriate symbols their first and second choice for President, and their first choice for Secretary. This ballot shall be counted by the Election Committee thirty days after the mailing of the election ballots, the person receiving the largest number of first choices for President being declared elected President, and the

[1] Recommended by Committee on Organization, consisting of John E. Anderson, Chairman; E. S. Robinson, and L. L. Thurstone, and adopted by the American Psychological Association at 1927 business meeting upon recommendation by the Council of Directors.

person receiving the largest number of first and second choices combined being declared elected Vice-President, and the person receiving the largest number of votes for Secretary being certified as Secretary. In case there is a tie for President, the number of second choices shall determine the election between those tied, the person with the largest number of second choices being declared elected. In case there is a tie for Vice-President under the conditions above laid down, first choices shall be given a weighting of two and second choices a weighting of one, and the person receiving the highest vote upon the basis of this weighting shall be declared elected. The election ballot described shall also contain the names of the forty-five persons receiving the greatest number of votes on the nominating ballot for the National Committee and in addition the names of the six persons nominated for President and the three persons nominated for Secretary, all fifty-four names to be arranged in alphabetical order. At the top of this portion of the ballot there shall be instructions to the voter to vote for not more than eighteen persons and to include in the eighteen persons so checked the two persons who had previously received votes as first and second choices for President and the one person who had received a vote for Secretary.

4. The Election Committee, upon receiving the ballots, shall count first of all the vote for President, Vice-President and Secretary in the manner above described. It shall then proceed to count the ballots for the National Committee, eliminating from consideration the three persons declared elected to the offices of President, Vice-President, and Secretary, respectively. The fifteen persons receiving the greatest number of votes after such elimination shall be declared elected. In case of a tie for fifteenth place a mail vote of the Council of the American Psychological Association shall be taken to decide the tie, voting being limited to the names of those persons so tied.

III. Duties of the National Committee

As soon as the Election Committee in charge of the election for the Ninth International Congress of Psychology shall have certified to the Council of Directors of the Association the names of those elected to the National Committee and to the offices of President, Vice-President, and Secretary, the National Committee shall hold a meeting for the purpose of organization on the call of the President. At this meeting, the National Committee shall proceed to select a Foreign Secretary for the Congress, an Executive Secretary for the Congress and a Treasurer for the Congress, all or any of whom may or may not be persons included among the elected eighteen, and immediately upon selection by the National Committee shall become ex-officio members of that committee. The National Committee shall also at this meeting select an *Executive Committee* consisting of seven members, including the President, the Vice-President, the Secretary and four other members of the National Committee. The Foreign and Executive Secretaries and the Treasurer shall be eligible to appointment on the Executive Committee if the National Committee sees fit. The National Committee shall at its meeting select a *Program Committee* of five members which shall consist of the Foreign Secretary, the Executive Secretary ex-officio and three other persons selected by the National Committee. At this meeting the National Committee shall elect a *Financial Committee,* which shall consist of the President, the Secretary and the Treasurer of the Congress ex-officio and five other persons selected by the National Committee. A *Com-*

mittee of Local Arrangements shall also be selected, which shall consist of the Executive Secretary of the Congress, two representatives of the place in which the Congress is to be held and two other persons selected by the National Committee, who may or may not be members of the committee, as the committee sees fit.

IV. Duties of Officers and Committees

1. *President.* It shall be the duty of the President to call the first meeting of the National Committee, to preside at meetings of the National Committee and in general to supervise the conduct of the Congress. He shall preside at any business meetings held by the Congress. He shall be ex-officio a member of the National Committee, the Executive Committee and the Financial Committee.

2. *Vice-President.* In case of emergency, making it impossible for the President to act, it shall be the duty of the Vice-President to take over the duties of the President. He shall be ex-officio a member of the National Committee, the Executive Committee and the Financial Committee.

3. *Secretary.* It shall be the duty of the Secretary to keep the records of the meetings of the National Committee and of the Executive Committee, to supervise the Foreign and Executive Secretaries, and in general to have charge of the correspondence, records and arrangements for the Congress. The Secretary shall have as assistants a Foreign Secretary and an Executive Secretary, selected by the National Committee as above described. The Foreign Secretary shall have charge of the correspondence and arrangements for foreign delegates. The Executive Secretary shall have charge of the internal arrangements of the Congress and handle the many details incidental to the organization and meeting of the Congress.

4. *Treasurer.* It shall be the duty of the Treasurer, selected by the National Committee as above described, to receive all subscriptions and fees for the Congress and to keep a record in permanent form of receipts and disbursements. Upon the close of the Congress it shall be the duty of the Treasurer to submit to the Council of the American Psychological Association for permanent record a financial report of receipts and disbursements. He is empowered to deposit the funds of the Congress and to draw upon the same as authorized by the National Committee.

5. *Executive Committee.* It shall be the function of the Executive Committee to undertake such duties as may be prescribed and laid out for it by the National Committee. In general, the Executive Committee is to be looked upon as a steering committee, which shall seek the counsel of the National Committee and report back to it at such times as the National Committee may prescribe.

6. *Program Committee.* It shall be the duty of the Program Committee to make arrangements for the program of the Congress, to set up a mechanism for the receipt of titles, abstracts and papers; to select chairmen; to select papers for the program, and in general to carry on all duties connected with the arrangement of the program. The Program Committee shall report to the National Committee upon request and shall undertake such additional duties as may be prescribed by that committee.

7. *Financial Committee.* It shall be the duty of the Financial Committee to undertake such duties in connection with the financial conduct of the Congress

and the preliminary arrangements thereof as may be prescribed by the National Committee. The term financial conduct shall be interpreted to include arrangements, both for indirect financial support, such as, for example, lectureships for foreign delegates, and direct financial support by way of subsidy, subscription or fee. The Financial Committee shall, in coöperation with the Treasurer, keep such records and reports of pledges, receipts, disbursements, etc., as shall be prescribed by the National Committee.

8. *Committee on Local Arrangements.* The Committee on Local Arrangements shall have charge of the preparations and arrangements for the meetings of the Congress, at such place or places as the National Committee may select for the meeting, and such other duties connected with the entertainment of visitors, the exhibit or apparatus and the conduct of the program of the Congress, as the National Committee may delegate to it.

V. Place and Time of Meeting

The National Committee shall, prior to the 1928 meeting of the American Psychological Association, select the time and place of the meeting of the International Congress, after consultation with the International Committees and representatives of organized groups of psychologists in other countries. It shall report to the 1928 meeting of the American Psychological Association both the place and date, but nothing implied in the requirement that the committee so report shall be construed as giving the American Psychological Association the power to alter the place or date. At least six months prior to the meeting of the Congress, the National Committee shall send to each Member and Associate of the American Psychological Association and to such other persons in this and foreign countries as it may select an announcement of the place of meeting, dates of meeting and tentative program. Other announcements may be sent at the discretion of the National Committee.

VI. Amendments to Regulations

The National Committee shall have the power to adopt such additional regulations governing the conduct of the Congress as it shall deem necessary.

The National Committee by a two-thirds vote of its entire membership may adopt such amendments to these Regulations as it sees fit, provided, however, that it shall have no power to adopt an amendment reducing the number of members on the committee or eliminating any one or all of the offices of President, Vice-President and Secretary.

VII. Succession

1. In case of the death, disability or resignation of any of the officers, or members of the National Committee, with the exception of the President, who in such case would be succeeded by the Vice-President as above provided, it shall be the duty and power of the National Committee to select a successor to fill the vacancy. In case of the death, disability or resignation of both the President and the Vice-President, the National Committee is empowered to select a successor to fill the vacancy.

2. In case the National Committee shall select the Executive Secretary, the Foreign Secretary and the Treasurer, or any one of these from its own elected membership, the National Committee is empowered to select additional members to bring the total membership of the National Committee up to twenty-one persons.

LIST OF PAPERS

(Arranged alphabetically by Authors)

1. Roy N. Anderson, A Personnel Study of the Officers of Highest Rank in the Army and Navy.
2. Bird T. Baldwin and Eva Fillmore, The Mind of the Rural Child.
3. W. V. Bingham and C. S. Slocombe, Why Some Motormen have Collisions.
4. H. G. Bishop, Visual Film and Visual Space Perception.
5. Charles Bray, Transfer of Learning.
6. C. W. Brown, The Influence of the Assimilative Character of Memory Materials upon Retention.
7. Karl Buehler, The Origin of Language.
8. Marion E. Bunch, The Influence of Punishment for Errors upon the Learning and Retention of the Stylus Maze.
9. Leonard Carmichael, An Experimental Study of the Development of Behavior in Vertebrates.
10. Hulsey Cason, Common Annoyances: A Study in Social Psychology.
11. Elmer Culler, Nature of the Learning Curve.
12. Karl M. Dallenbach, The "Range of Attention."
13. Chester W. Darrow, Multiple Physiological Changes as a Basis for Differentiating Emotional Responses.
14. J. F. Dashiell and J. C. Bagwell, Direction Orientation in the White Rat.
15. Raymond Dodge, Protopraxic and Epicritic Stratification of Human Adjustment.
16. Grace M. Fernald, Defects of Symbolic Thinking with Special Reference to Reading.
17. Helen Louise Flinn, The Significance of Alcohol in Mental Deterioration.
18. Frank N. Freeman, A Study of the Effect of Environment on the Intelligence of Foster Children.
19. Frank Gatto, The Influence of Directed Supplementary Reading on Comprehension of Seventh Grade History.
20. A. R. Gilliland, The Relation of Phase to Intensity in Sound Localization.
21. J. A. Glaze, The Association Value of Non-sense Syllables.
22. Irene L. Glenn, A Study of Manual Tasks in Relation to Their Constituent Units.
23. E. Louise Hamilton, The Effect of Short Intervals of Delay on Food Seeking Behavior in the White Rat by Means of the Obstruction Method.
24. Hughbert C. Hamilton, The Effect of Incentives on Fineness of Discrimination Measured on the Galton Bar.
25. Starke Hathaway, An Improved Psychogalvanic Reflex Apparatus with Preliminary Findings on Success and Failure Responses.
26. Thorleif G. Hegge, Investigations in the Memory of Subnormals.
27. L. B. Hoisington, The Perception of Objects as Determined by Form.
28. Paul Huffman, The Külpe-Girgensohn Method Applied to Denominational Differences.
29. Clark L. Hull, Differential Punishment in Stylus Maze Learning.
30. Rachel Isbell, The Musical Talent of Indians.
31. Arthur T. Jersild, Pre-examination as a Factor in Learning.

32. Buford Johnson, Changes in Muscular Tension During Co-ordination of Hand Movements.
33. H. M. Johnson, Some Fallacies Underlying the Use of Psychological "Tests."
34. Edward S. Jones, Analysis of Scholastic Motivation.
35. Harold Ellis Jones, Conditioned Psychogalvanic Responses in Infants.
36. Enoch Karrer and H. C. Stevens, The Response of Negative After-Images to Passive Motion of the Eye Ball.
37. Truman L. Kelley, Orthogonal Mental Traits.
38. Forrest A. Kingsbury, The Personal Analysis Bureau: A Venture in Rating and Testing Service.
39. Arthur W. Kornhauser, Changes in Attitudes Resulting from a College Course in Economics.
40. Herbert Sidney Langfeld, Apparent Movement with Single Stimulus.
41. K. S. Lashley, Neural Factors in Intelligence.
42. H. S. Liddell and T. L. Bayne, The Study of Cerebral Inhibition in the Sheep by the Conditioned Reflex Method.
43. Howard Porter Longstaff, Speed and Accuracy as Factors in Achievement Tests in Psychology.
44. John A. McGeoch, The Influence of Degree of Learning upon Retroactive Inhibition.
45. Florence Mateer, The Clinical Study of Normal Children.
46. Mark A. May, Techniques for Testing Inhibition in Children.
47. Max Meenes, A Phenomenological Description of Retinal Rivalry.
48. Norman C. Meier, The Measurement of Aesthetic Sensitivity.
49. Max F. Meyer, The (non-resonating) Function of the Cochlea demonstrated on a hydraulic model ten times magnified and transparent.
50. Walter Miles, Ocular Dominance—Methods and Results.
51. John J. B. Morgan, Cardiac Reactions to Noise.
52. F. A. Moss, The Measurement of Social Intelligence.
53. Garry Cleveland Myers, Finding Mistakes Versus Correct Association in Learning Improvement in Arithmetic.
54. Willard C. Olson, Neurotic Tendencies in Children: Criteria, Incidence and Differential Tests.
55. Marion Outhit, Variations of Intelligence within Families.
56. L. A. Pechstein, Introversion as a Factor in the Vocational Selection of Teachers.
57. J. C. Peterson, A Uniform Test of General Intelligence.
58. James P. Porter, Emotional Sex Differences in College Freshmen as Indicated by Accumulative Error Scores and Comparable Measures.
59. Sarah M. Ritter, A Case of Automatic Writing by a Blind Subject.
60. Curt Rosenow, Certain Aspects of Heredity and One More Definition of Instinct.
61. Christian A. Ruckmick, A Reinterpretation of the Introspective Method.
62. Robert H. Seashore, Measurement of Motor Skills.
63. Georgene Seward, Reaction Time as a Measure of Confidence in Recognition.
64. W. L. Sharp, Disintegration of the Maze Habit upon Removal of the Food Incentive.

65. Sadie Myers Shellow, The Place of the Interview in Selection.
66. Henry E. Starr, Motivational Types as Illustrated by Respiratory Graphs Obtained by a Modification of the Methods Usually Employed for Basal Metabolism Determinations.
67. H. M. Stanton, The Seashore Talent Test as Administrative Aids.
68. E. G. Stoy, A Study of the Ocular Attitudes Involved in Thinking of Spatial Relations.
69. Edward K. Strong, Jr., The Vocational Interest Test.
70. W. S. Taylor, A Demonstration of Suggestion and Involuntary Imitation for the Classroom.
71. L. L. Thurstone, The Absolute Zero in Intelligence Measurement.
72. Clara H. Town, A Clinical Test to Determine Emotional Trends and Emotional Balance.
73. Ruth Updegraff, The Visual Perception of a Distance in Young Children and Adults.
74. Isabel K. Wallace, Reaction Time and Discriminatory Judgments.
75. J. E. W. Wallin, Capacity Tests in the Field of Achievement—A Phonetic Spelling Scale.
76. Beth Wellman, Significant Factors in the Motor Coördination of Young Children.
77. Raymond Holder Wheeler, Basic Rhythms in Motor Learning.
78. Raymond R. Willoughby, "Genius" and Genetics.
79. Herbent Woodrow, Temporal Discrimination in the Monkey.
80. R. S. Woodworth, Computing the Standard Deviation and Probable Error of a Binet Mental Age.
81. G. E. Wylie, The Relative Value of the Whole and Part Methods as Dependent upon Practice.
82. Joseph U. Yarborough, Social Background as a Basis for Predicting Academic Success.
83. Robert M. Yerkes, Mnemonic Processes in the Chimpanzee.
84. Paul Campbell Young, Intelligence and Suggestibility in Whites and Negroes.
85. Paul Thomas Young, Auditory Localization with Transposition of the Right and Left Ears.

ABSTRACTS

PROGRAM A

GENERAL PSYCHOLOGY

WEDNESDAY, DECEMBER 28, 9:30 A.M.
COMMERCE AUDITORIUM
H. L. HOLLINGWORTH, *Chairman*

Nature of the Learning Curve. ELMER CULLER, University of Illinois.

A wide variety of experimental evidence leads to the following propositions:

(1) The learning process begins slowly, accelerating until the task is half-complete, then again decelerating to zero as mastery is attained, the whole curve being roughly symmetrical about its mid-point.

(2) The kinds of curve commonly found (positive, zero, negative acceleration) are not contradictory but complementary; they are *successive stages* in a learner's progress from beginning to mastery (say, first third positive, mid-third zero, final third negative). From ordinary experiments it is quite impossible to determine how much real learning has actually occurred; but when learning is known to begin near zero, it can be shown that positive acceleration regularly appears at the start and later swings over to negative.

(3) The above conception proves to be (a) empirically desirable. (i) It not only takes care of all three types of curve above noted (including cases of "sudden" learning) but accommodates material from widely unlike functions as well. (ii) It provides a convenient mnemonic index; time being involved in every form of acquisition, the probable error of this curve (in time-units) is a *universal index* of learning, by which we may quantitatively compare the same or different subjects working on the same or unlike materials. The conception is also (b) theoretically helpful. Learning is directly allied to the psychometric functions. Any stimulus of a given kind (visual) may vary in three dimensions: extent (amount of receptive tissue affected), degree (amount of work done within unit-area during unit-time), duration (period through which stimulus

continues to act). When degree (say, energy of light) is increased, other variables being constant, the organism's response, as measured by proportion of reports "present" (vs. "absent") or "lighter" (vs. "darker"), rises at first slowly, then more rapidly, then again slowly, describing in its ascent the well-known cumulative percentile curve; when extent is alone increased (length of line, size of area,) the reports "greater" follow the same course; if finally duration of stimulus be alone increased (as in all cases of learning), is it not reasonable that time organism respond in the same fundamental way?

The exact equation of this curve awaits further investigation, but two are most likely; the cumulative normal curve, often called Phi-gamma, and the monomolecular autocatalytic, which is a well-established form of chemical reaction. It will hardly be denied that learning is fundamentally a bio-chemical process; this conception permits it to be stated in those terms.

The (non-resonating) Function of the Cochlea Demonstrated on a Hydraulic Model Ten Times Magnified and Transparent. MAX F. MEYER, University of Missouri.

There are those who are so sure that when the creator made the mammalian ear he put resonating harp strings into it that they are deaf to both arguments, the psychological one which calls for a mechanical function of analysis totally different from that of resonance, and the anatomical argument that the phragma which divides the tube of the cochlea has none of the properties of a string or membranous musical instrument, but all of the properties of a partition made to resist hydraulic pressure and friction.

On the other hand, even open-minded psychologists are not infrequently very deficient in their ability to form a clear conception of a *hydraulic* function. "It ought to be demonstrated to us *ad oculos*," they have told me. For their benefit I have constructed a model of the cochlea with transparent walls, so that one can leisurely observe, by using a sufficiently viscous liquid, the now slowly proceeding movements of the liquid as well as of the phragma with the naked eye and even from a distance of thirty feet.

The model exhibits all the mathematico-physical principles which I described as long as thirty years ago, and with the addition of some details twenty years ago in my "Mechanics of the Inner Ear" and elsewhere, and in brief, but very complete, form suitable for

teaching students in my "Psychology of the Other-One" on 19 pages (294-312), contradicting thereby those textbook writers who have said "The Bonnier-Meyer theory of hearing is not easily stated in abbreviated form," and who yet devote twenty pages to a theory of vision without scruples. No one has ever offered any contradictory criticism to this hydraulic theory. Many, however, have declared their intellectual inability to comprehend it.

My model demonstrates that considerable degree of viscosity of the liquid prevents high tones from ever affecting the phragma very far toward the tip of the cochlea. This explains why over-prolonged high tones never injure the tissues very far from the base of the cochlea, while low tones can cause injuries in the upper turns of the cochlea and do cause them there especially since the phragma is there rather wide and thus less pressure-resistant.

One can also demonstrate that the phragma "slightly" returns from an extreme location (hyperthesis) to a less extreme one (parathesis) on the same side of the average location (thesis) if the hydraulic pressure merely decreases without changing its algebraic sign. This means that a pair of mere inflection points (and not necessarily of curve extrema) suffices to insure the hearing of a corresponding and relatively higher tone which is included in the compound wave.

Of course, the model demonstrates, in addition to such more remarkable facts, all the more elementary facts of audition, with which everybody in this audience is familiar.

Auditory Localization With Transposition of the Right and Left Ears. PAUL THOMAS YOUNG, University of Illinois.

The aim of the present experiment was to study the characteristics of sound localization with the positions of the ears interchanged, and further to determine whether the disturbed localizations would return to normal after prolonged habituation. The ears were transposed acoustically by means of sound-proof tubes. The right auditory meatus was extended over the head to a sound-receiving horn situated over the left ear, and a similar unit placed the left ear acoustically over the right. Time, phase and intensity differences between the ears were reversed. At first auditory localizations were misplaced 180 degrees; two types of reversed localization were noted. When the sound-source was seen or its position known localizations were normal despite the transpositions of the ears. At times,

however, visual and auditory experiences were dissociated as, for example, a metronome was seen beating silently in one place and heard ticking upon the opposite empty wall. To study habituation the apparatus was worn daily for a period of a month. Finally it was worn for three complete days. At night the ears were stopped so that all hearing for the latter experiment was with the ears transposed. Throughout the experiment localizations were normal whenever the sound-source was seen or its position known. Sounds which came suddenly, unexpectedly or from an unknown source were found to be transposed in their localization; and this disturbance remained till the close of the experiment. The observations clearly suggest a distinction between two types of sound localization: (1) visual-auditory and (2) auditory. The latter is relatively rare in every day life.

Protopraxic and Epicritic Stratification of Human Adjustment. RAYMOND DODGE, Institute of Psychology, Yale University.

The traditional classification of human responses as reflex, instinctive, habitual and voluntary, as though they were discreet levels of behavior correlated with supposed points of origin at various levels of the nervous system involves a simplification fallacy of far-reaching influence on the understanding of actual human behavior phenomena. Our thesis, on the contrary, is that many, if not all, adaptive acts of the adult human are really complicated responses determined at various levels of integration. They commonly begin as a relatively crude approximate or protopraxic adjustment of short latency, and develop into more adequate epicritic adjustments according to the equipment of the individual by stages that are often indistinguishable except in experimental situations. The third point is more problematic and is presented only as a working hypothesis. Protopraxic and epicritic are not the names of entities of behavior, but are purely relative terms referring to greater or lesser elaboration of the sensory data. While our experimental discussion chiefly concerns the rôle of reflex protopraxic responses in total human adjustment, a considerable variety of beginning-responses may be regarded as protopraxic in contrast to those phases of response that occur after maturer elaboration. In this sense instinctive and habitual protopraxias correspond schematically to the reflex phase as crude adjustments of short latency, which commonly pass into finer or epicritic adjustments to differentially elaborated data concerning the

total environmental and purposive situation. Morals and even science itself thus represent strata of epicritic adjustment to which habit and impulse are protopraxic.

Neural Factors in Intelligence. K. S. LASHLEY, Behavior Research Fund, Chicago.

To test the relation of cerebral mass to the ability to learn and retain various habits, rats were subjected to cerebral injuries ranging from 2 to 81 per cent of the entire neopallium and involving, in one or another, every part of the cortex. They were then trained successively in five mazes and two discrimination boxes, with tests of retention after six weeks. Results to be presented in tabular form show:

1. Difficulty in learning the mazes increases in direct proportion to the extent of brain injury.

2. The decrease in learning ability is essentially the same for any given extent of injury, irrespective of the cortical areas involved.

3. The defects are permanent.

4. The reduction in learning ability for each degree of injury is directly proportionate to the complexity of the maze.

5. The capacity to form discrimination habits is practically unaffected by any amount of cerebral destruction.

6. The results are independent of the receptors involved in the habits and of the destruction of cortical sensory or motor fields.

7. Retention correlates closely with learning ability. These results oppose current doctrines of the localization of learning ability and intelligence. They are also incompatible with theories which ascribe learning to a change in the conductivity of specific neuron systems.

A Reinterpretation of the Introspective Method. CHRISTIAN A. RUCKMICK, University of Iowa.

Much of the discussion of introspection and the confusion of ideas involved is historic and epistemological. The term itself is etymologically unfortunate. The real problem centers around the scientific accuracy and adequacy of the data reported. Since all scientific observation must ultimately be reported through introspective channels, in the final analysis a criticism of this method undermines observation in every other science. Some of these observations in the physical and natural sciences are made under such conditions and by such individuals that the mental factor can not be omitted.

Thus psychology has many times corroborated or derogated so-called scientific observations in the other sciences.

One of the chief misunderstandings is the process of observation itself. The notion is abroad that it is somehow subtle, complicated, difficult and generally mysterious. This is again medieval. Observations in psychology may occur under conditions that range from the simple to the complex. Observations of fair scientific accuracy have been made by children or by abnormal minds. In psychology, as in every other science, training tends toward expert fidelity of report. A century of work in optics, acoustics, and haptics would have to be discarded with the overdraw of the introspective method in its simpler aspects. Totally new concepts with terms to match would have to be used.

Psychology will remain scientific not through a revision of the methods of observation but through the control of conditions under which observation takes place. Its right to exist as a science will not be strengthened but weakened by merging it with the biological sciences. But as even the extreme behaviorists admit in comparison with the other sciences its subject-matter, experience, remains unique and intact.

Certain Aspects of Heredity and One More Definition of Instinct. CURT ROSENOW, Institute for Child Guidance, New York City.

It is a very common view that the inherited characteristics of the individual cannot be changed. Inherited characteristics, especially inherited defects, are supposed to persist through life. But, obviously, when we cannot change a characteristic in the way in which we would like to, the reason is that we do not know how. Heredity has nothing to do with it.

The proponents of the view that the human animal is endowed with numerous instincts hold that these instincts are basic, fundamental characteristics which determine at the beginning of life the lines which subsequent development must take. The opponents deny this and hold that most of all so-called instincts are habits which would be different with a different life history. They deny that the concept of instinct has explanatory value. The view of the present paper is that the idea of instinct is valid as a quasi-statistical conception. Viewed and used in that way, it has as much explanatory value and utility as any other body of statistical fact.

All behavior is explained completely by the history which has

eventuated in it. In some sense, all behavior is inherited. But, obviously, it is not in that sense that the term is used ordinarily. As generally understood, instinctive behavior is behavior which is repeated generation after generation, which is useful in the Darwinian sense, and which develops in independence of environmental influence. The last notion, an idol of the den, is a logical impossibility and should be abandoned. The following definition results. Any form of meaningful behavior is to be regarded as instinctive if and so far as it is an adaptation to biological necessity developed during the history of the species *and of the individual,* provided such behavior occurs in (let us say) 98% of the species. In developing this definition it will be emphasized that the meaning of instinctive behavior does not necessarily nor ordinarily coincide with the result (or end) of the behavior. Indeed, as a rule, the organism has no knowledge, conscious or "unconscious," of these end results. In the case of human beings there develops gradually some knowledge and understanding of the behavior and of its meaning. But knowledge and understanding of biological processes is the result of systematic study, not a property of consciousness nor of conscious behavior.

PROGRAM B

EXPERIMENTAL PSYCHOLOGY

WEDNESDAY, DECEMBER 28, 10:00 A.M.

ROOM 200, PHYSICS BUILDING

HARVEY A. CARR, *Chairman*

The Response of Negative After-Images of Passive Motion of the Eye Ball. ENOCH KARRER and H. C. STEVENS, Elyria, Ohio.

Observations are reported on the behavior of negative after-images in response of passive motion of the eyeballs. It is shown that negative after-images do not move in the field of vision, when the eyeballs are caused to move passively. This fixity of the after-image during passive motion of the eyes is in marked contrast to the motility and adaptability of the negative after-image when the eyes are moved voluntarily by their own extrinsic muscles. A comparison with certain other entopic phenomena is made. The bearing of this observation upon the rôle of the eye muscles in visual space localization is pointed out.

A Phenomenological Description of Retinal Rivalry. MAX MEENES, Lehigh University.

Rivalry was set up by the use of colored glasses, figures, colors and figures combined, and solid objects. Rivalry is the differential behavior of two visual members integrated into a "unit-like complex." One of the members usually predominates in the rivalry, although alternation is possible; hence we may speak of an active member and a passive member. The active member is nearer the observer, is filmy, rather distinct, and mobile; while the passive member is farther away from the observer, less filmy, blurred, and static. In rivalry between black and white objects, the active member is very black while the passive is grayish. In rivalry of figures, the active member is usually determined by the horizontal stimulus. The active member is always determined by the smaller stimulus where two stimuli are unequal in physical value. Rivalry is thus unlike figure and ground, the fluctuations of the negative after-image, or fleeting clouds. The results are independent of ocular difference.

Visual Film and Visual Space Perception. H. G. BISHOP, Wittenberg College.

Visual film (Katz), since it is the ultimate mode of appearance of visual experience, must be the origin of all our visual experiences, including visual space. According to this proposition, we planned experiments to see if we could generate space out of film, or if not could find film in the act of being transformed into non-filmy space. Presumably, the simplest case of the problem would be the addition of film to a very filmy, simple object, for instance, the negative after-image, as typical film, projected upon black velvet, as a typically filmy object. Such apposition of spatial and non-spatial factors summates to a resultant which lies in the direction of the stronger component. When film is strong, it will stand upright upon the velvet, which lies horizontally, but upon weakening or by a new fixation it will lie upon the velvet, thus taking its size and direction from the background, whose position and spatial character are determined, presumably, by the same factors which convert the after-image film into velvet of a new hue, one of whose components is the hue of the after-image. If one increases the objectivity of the background by substituting newspaper for velvet, the film of the after-image cannot, in general, resist the space-forming power of the newspaper and will lie in the

plane of the paper and be differentiated from it only by a difference in hue.

Experiments made by introducing tridimensionality into the projection phase but not into the stimulus phase gave the same results. A dense film overcame the tridimensionality of a rather filmy cube, for a few moments, but subsequently the weakening film disappeared as film and only its hue showed in the cube. Similar inability of film to resist tridimensionality was found when the projection cube was less filmy and, consequently, more objective. Objectivity was increased by unequal illumination of the three faces turned toward the observer, by covering the cube with colored paper, or with newspaper. Use of cubes as stimuli and cubes for projection ground, thus introducing tridimensionality into both the stimulation and the projection phases did not materially alter the behavior of film.

It seems probable that a retinal image of considerable qualitative variety, a predominance of retinal over central effects and certain oculo-motor kinaesthetic components are some of the factors indispensable for perception of tridimensionality.

The Perception of Objects as Determined by Form. L. B. Hollingworth, Cornell University.

To get descriptive reports of experience when the *O* had the "set" to see an object in terms of form alone, we arranged a device to expose uniformly black ink blots of irregular outlines in any one of four positions; that is, upright, turned 90 degrees right or left or 180 degrees. There were four different procedures. In a fifth series we used the approximate forms of familiar objects.

The results admit the fractionation of the completely developed perception of an object into five stages. The stages, as given in experience, may in part overlap and certain of them, at least, may be highly telescoped, but in no case except the last is there a sharp break between them. Even this break does not appear with familiar objects. We have called these stages "form," "axis-balance," "fitting of details," "summation" and "naming."

The first four are at the pre-verbal level. The first gives the general form whether huddled, linear or scattered. In the second, which is very closely connected with the first, there arises an axis with one significant end and a balancing of the form about this axis. All this gives a bodily "set" with which all further experience must somehow "fit." It determines the kind of object it must be. Then

comes the exploration of the various irregularities which add detail to make the class object a specific one. If the irregularities fail to "fit" the class object a reapprehension of the form in terms of axis-balance takes place. When all or enough of the details "fit" to make the object specific, the bodily tension and the pressures that carry the details give way to an habitual pattern of experience accompanied by the glow of recognition. This gives the meaning of the particular object after which the naming response is touched off.

Once the "set" for the form arises, the experience goes on under the dominance of the bodily tension or background. The ignoring of non-significant details, the rounding out of contours, the transformation of angles, even the possibility of substituting another form all go to show that the perception of an object is much more a matter of bodily than of stimulus experience.

The "Range of Attention." KARL M. DALLENBACH, Cornell University.

The "range of attention" experiments of the past 100 years have been concerned with the determination of the number of objects that can simultaneously or successively be perceived. Not only has the "constant," in these experiments, been differently computed but the subjects have given their reports at various levels of cognition. It is consequently of smaller wonder that very different constants have been obtained.

To show that the constant is dependent upon the degree of cognition, and that the range of attention—if it is possible to formulate such a problem—can properly be investigated only when the cognitive factor is eliminated, we performed a tachistoscopic experiment instructing our three subjects to report, in one series of experiments, the distribution of the attensity (attributive clearness or vividness) of their impressions during the exposure; in a second series, the number of stimuli exposed; in a third series, the number and the names of letters exposed; in a fourth series, the number and shape of forms exposed; and in a fifth series, the number, color, and shape of the particular forms exposed.

The constant, as computed by the method of constant stimuli was different in every series of experiments varying for every subject inversely with the degree of cognition. In series 5, in which a high degree of cognition was required, the constant for the three subjects was approximately 3; in series 4 it was approximately 4; in series 3

it varied between 6 and 8; in series 2 between 8 and 12; and in series 1, in which cognition was a minimum, the constant for the single subject whose results could be cast into the ogive form was approximately 19.

The fact that the constant varied so greatly with the degree of cognition, and that none could be obtained for two of the subjects in series 1—the series in which the attentive distribution was reported—warrant the conclusion that the question of range is not a proper one to ask regarding attention. The attentive consciousness is an integrated whole; and, as such, the range of attention is unity.

The Relation of Phase to Intensity in Sound Localization. A. R. GILLILAND, Northwestern University.

By means of a specially constructed apparatus both the phase and the intensity of sounds were independently varied. The tone coming from a single source, after being controlled for the two factors, was led to either ear of the subject. Three different sounds were used, a tuning fork, 90 v.d., an electric bell the principal pitch of which was about 250 v.d., and a closed tube whistle, 1000 v.d. The sound was localized by the subject in each case as coming from some place outside of but near the head.

In a series of forty-two reports for each pitch by several subjects, phase and intensity were plotted against each other in order to determine the relative effect of each in localizing the sound.

By this method it was found that intensity was used almost exclusively in localizing the sounds for all three pitches. Phase variations had relatively little effect on localization. Great individual differences were found in ability to localize tones.

The Association Value of Non-sense Syllables. J. A. GLAZE, Ann Arbor, Mich.

Twenty-one hundred non-sense syllables, all that could be made from the alphabet (three letters, a vowel between two consonants), were presented to fifteen subjects by aid of the tachistoscope. Subjects were sophomores and juniors at Colorado College.

Subjects were instructed to look at each syllable (exposed for three seconds) and (1) Indicate with a synonymous word what the syllable reminded him of, if anything, (2) But if the syllable did not remind him of anything, then he was not to say anything, and (3) If something came to mind that he could not characterize quickly, then respond with a "yes."

A practice series of fifty sense syllables of three letters each were used to acquaint the subject with the nature of the task. None had ever acted as a subject where non-sense syllables were employed previous to this. An assistant copied the responses, apparently unknown to the subjects.

Results: There were 106 syllables that had zero per cent association, *i.e.* no subject gave a response when these were presented, and 116 syllables that have 100 per cent association. Between these extremes an almost equal number of syllables is found in every possible percental distribution. For instance, 14 out of 15 subjects gave a recall word for 131 syllables (93.33 per cent of the subjects); 13 gave a word for 134, and 12 gave a word for 131 syllables, and so forth.

The syllables with high association value were (1) the first three letters in a word, (2) abbreviations and (3) those which sounded like words. Those with low association value contain many q's, x's and z's. Of the 106 syllables in this list 56, or more than half, began with one of the three letters named.

(Here a list is given of the things to which many of the words referred, such as clothing, food, slang, affection, trade-marks, and so forth.)

That associations were sought by the subjects cannot be denied. That none were found in some syllables is significant. I believe that most of the syllables of low association value can be used with a fair degree of safety, and that we are permitted to say that they are "relatively free from associations." For instance, from zero per cent to twenty per cent association there are 490 syllables, a sufficient number for most problems. At the other extreme are syllables that are, at least for the subjects in this experiment, about as meaningful as common words.

PROGRAM A

SESSION FOR INFORMAL REPORT OF GRADUATE STUDENTS

WEDNESDAY, DECEMBER 28, 2:00 P.M.
COMMERCE AUDITORIUM
RAYMOND DODGE, *Chairman*

The Relative Value of the Whole and Part Methods as Dependent Upon Practice. G. E. WYLIE, University of Chicago.

Transfer of Learning. CHARLES BRAY, Princeton University.

Pre-examination as a Factor in Learning. ARTHUR T. JERSILD, Columbia University.

The Influence of the Assimilative Character of Memory Materials Upon Retention. C. W. BROWN, University of Chicago.

Speed and Accuracy as Factors in Achievement Tests in Psychology. HOWARD PORTER LONGSTAFF, Ohio University.

Variations of Intelligence Within Families. MARION OUTHIT, Columbia University.

The Musical Talent of Indians. RACHEL ISBELL, University of Denver.

The Külpe-Girgensohn Method Applied to Demoninational Differences. PAUL HUFFMAN, Wittenberg College.

A Personnel Study of the Officers of Highest Rank in the Army and Navy. ROY N. ANDERSON, Columbia University.

The Influence of Directed Supplementary Reading on Comprehension of Seventh Grade History. FRANK GATTO, University of Pittsburgh.

PROGRAM B

EXPERIMENTAL PSYCHOLOGY

WEDNESDAY, DECEMBER 28, 2:00 P.M.
ROOM 200, PHYSICS BUILDING
R. S. WOODWORTH, *Chairman*

Ocular Dominance—Methods and Results. WALTER MILES, Stanford University.

Optical dominance, scarcely mentioned in the older literature, seems now to have become a rather generally recognized visual condition, although its full significance is not yet evident. As a rule dominance can be detected only by means of special tests. Most of the

tests at present employed are far too subjective. Unilateral sighting appears to be the best general method. Of the alignment tests Parson's manuscope (or manoptoscope) has the advantage that the subject does not know at the outset which eye is being used. But Parson's routine makes the results depend on the subjective report and limits the possibility repeated observations on the same individual.

In the A-B-C Vision Test (area-blackness-comparison), reported here, a much simplified method is used. The procedure somewhat resembles Parson's method but avoids the difficulties that his device and routine must meet. The A-B-C Test has three advantages: it may be repeated many times on the same person without obvious interference of handedness; it avoids the automatic informing of the subject in regard to findings; and, most important, it is thoroughly objective. The test equipment consists of a specially devised V-scope and a series of test cards.

More than 350 individuals have been tested at Stanford. Five, ten, or in a few cases more tests were given each person. About 90 per cent of the results showed perfect consistency. Most of the remaining 10 per cent showed distinct preference. Right eye and left eye dominance occurred in about 64 and 34 per cent respectively. About 2 per cent of the cases showed no well marked tendency. About one third of the right-handed individuals demonstrated left eye dominance, while the left-handed were fairly evenly divided. Adults and children showed very similar results as did also Chinese men and American men. No significant sex differences were found.

Reëxaminations after a period of two weeks or longer showed identical results in at least 80 per cent of the cases. The learning of a special habit such as using one eye at the microscope apparently had not exercised a decisive influence on dominance. About 50 per cent of superior adults were found to have become aware of the fact of dominance in their own cases from the experiences of everyday life.

Apparent Movement With Single Stimulus. HERBERT SIDNEY LANGFELD, Princeton University.

The phenomena of apparent movement have generally been obtained by two or more stimuli which are separated spatially, and presented successively either to one or both eyes. In the present paper are described the apparent movements produced by a single stationary stimulus—line, dot, etc.—which is presented successively to the two eyes. Various forms of exposure with rotating disc and

with iris shutter were tried, in order to determine the influence of the movement of the shutter upon the apparent movement of the stimulus. Different shapes of the stimuli were use in order to analyze the nature of the phenomena. The exposure time was varied. Arrangements of line and dot were made which seemed to preclude eye movement. In all cases apparent movement occurred, similar to that obtained by the use of two or more stimuli. Movement was also perceived if the line or dot was exposed to only one eye, provided that the background without the line or dot was immediately afterward exposed to the other eye.

Changes in Muscular Tension During Co-ordination of Hand Movements. BUFORD JOHNSON, The Johns Hopkins University.

The problem of measuring the degree of muscular tension during such performances as tapping, writing, and throwing and of relating the data obtained to other measurements of emotional tendencies was attacked. The major problem was the designing and constructing of apparatus that would give the desired data. This paper reports a preliminary study of the pressure exerted in eye-hand co-ordinations with a description of the apparatus. The amount and changes of pressure exerted by the fingers in grasping a stylus during the performance of tapping upon a board as rapidly as possible was studied. The treatment of the pressure record in quantitative terms was made.

Records of children between the ages of two and six and of adults were analyzed. The efficiency of the performance as indicated by speed and precision of movements has been studied in relation to the pressure changes. Results from simple tapping movements have been compared with those from a more complicated form of movement. Right- and left-hand performances have also been studied. The method of study is suggested as offering one measurement contributory to differentiation of individuals with regard to tendencies sometimes characterized as temperamental.

Multiple Physiological Changes as a Basis for Differentiating Emotional Responses. CHESTER W. DARROW, Institute for Juvenile Research.

This study is based upon the assumption that the physiological aspect of emotion is a constellation of bodily activities. It assumes that no single bodily change necessarily serves to distinguish one

emotion from another, but that in the pattern of, or in the relation between changes, is the basis for differentiation. For the purpose of this investigation we have at the Institute apparatus for simultaneous, continuous photographic records of circulatory, cutaneous (galvanic, secretory, and thermal), respiratory, pupillary, and gastro-intestinal changes.

One of our first studies has been to determine the typical response to various stimuli. Sensory excitations such as a shout or a light slap seem to be especially effective in the production of cutaneous changes either electrical or secretory, and they are characteristically accompanied by little change. Such changes as occur are most frequently accompanied by a drop in blood pressure. Only when the sensory stimuli are novel or unexpected is it common for the blood pressure to increase. Ideational stimuli such as words or pictures generally produce a rise in blood pressure. This is especially marked when they are of such a character as to arouse "complexes." Their effect upon the galvanic reflex, however, is relatively less pronounced than that due to moderate sensory excitation. It is, therefore, possible to select sensory and ideational or emotional reactions for which the galvanic responses are of approximately equal magnitude, and under these conditions the degree of the blood pressure change will serve to discriminate the "complex arousing" and the simple ideational from the sensory stimuli. Or, if we select reactions for which the blood pressure responses are equivalent, the galvanic response will differentiate the situations under which they were secured. In other words, various stimuli may affect the cutaneous and the circulatory mechanisms in the same way but arouse them in differing degrees. Whether we shall find other means of distinguishing stimulating conditions or of characterizing the traditional "feelings" and "emotions" by their relative physiological effects remains to be seen. At present we seem to be threatened by the bogey of individual differences.

Cardiac Reactions to Noise. JOHN J. B. MORGAN, Northwestern University.

Previous experiments have indicated that subjects are able to adapt to noise to such an extent that there is but a transient and minor effect upon efficiency. The present experiment was performed in an attempt to determine the effect of violent auditory stimuli upon the heart action.

By means of an Einthoven string galvanometer photographic records were taken of the heart action of ten subjects. Records were taken when the subjects were free from auditory stimuli and when loud sounds were present. The sounds were produced by means of Western Electric audiometers. These were amplified by means of vacuum tubes and presented to the subject through loud-speaking telephones.

The tentative conclusions from these experiments may be stated as follows:

1. While the effect is not very marked, the heart action is modified by the introduction of loud sounds.

2. The effect seems to be more apparent in the irregularity of heart action rather than in a change in average rate.

3. Subjects vary in the way in which they respond to the sounds given. Some individuals show very little reaction while others show a very definite response.

4. Different sounds have a different effect. The most effective seems to be in intermittent sound. High-pitched sounds probably have more effect than low-pitched ones.

5. The suggestion of a "horrible din" given to a hypnotized subject brought about a quickening of the pulse which was more pronounced than any effect produced on any subject by a direct sound. The explanation of this result needs further study, but it suggests that the greater part of the effect of loud auditory stimuli is not a direct reflex effect, but is due to conditioning or to the affective attitude of the subject toward the sound.

Basic Rhythms in Motor Learning. RAYMOND HOLDER WHEELER, University of Kansas.

When the conditions of motor learning (maze) are reduced to simplest terms, recess periods omitted, and the performance carried out to 200 and 300 repetitions without relaxation of the subject between repetitions, certain very striking and constant waves appear in the speed curve, indicating basic neuromuscular rhythms. These rhythms seem fundamental and of greater importance than most of the conditions of learning heretofore studied. The waves are repeated several times during the performance of each subject, which lasts frequently more than two hours. Typical curves are presented.

Minor rhythms occur within the major ones, giving to the wave a definite contour which is characteristic for a given subject. Striking differences appear in these patterns from individual to individual.

While these waves represent periodic gains and losses in motor co-ordination, exactly parallel changes in attitude, mood, vigor of determination and ease of voluntary control take place in the subject. So-called subjective phenomena grouped under the terms "attention" and "will" change with the waves of the curve and do not seem to cause them. Rather they are co-symptoms, with motor co-ordination, of certain fundamental metabolic conditions. They are descriptive of periodic changes brought about by the experimental situation and follow the same laws as those of motor co-ordination. The length and amplitude of the waves in the curve seem to depend in part upon the character of the initial drop. Subjects are apparently unable to alter these rhythms by voluntary effort.

The waves are obviously not time rhythms. That they are determined by the number of repetitions, as seems evident, and that time should be an independent variable, point to the all or none principle and to the completed performance as a physiological unit. This leads to a new physiological theory of learning, which is presented briefly.

The Influence of Degree of Learning Upon Retroactive Inhibition. JOHN A. MCGEOCH, Washington University.

The influence of degree of learning upon retroaction has been studied with five widely varying degrees of learning, viz., 6, 11, 16, 21 and 26 repetitions. The learning materials were nonsense syllables in 9-syllable lists, exposed on a memory drum at the rate of two seconds per syllable and learned by the anticipation method. A rest and a work condition for each of the five degrees of learning are compared. In the work condition the interval between learning and relearning was filled by the learning of an interpolated list. Ten subjects, previously practiced in the use of the anticipation method, were put through all degrees of learning under each condition twice in a counterbalanced practice order. Retroaction is measured in terms of the relative differences between the rest and work conditions for both recall and relearning scores.

The computation of overlearning ratios shows that the increase in number of presentations meant a corresponding increase in degree of learning. With the larger numbers of presentations overlearning was very great. The relative amount of retroactive inhibition, measured in terms of both recall and relearning scores, varies inversely as the number of presentations given the material to be learned. Even lists learned to 26 repetitions, however, suffer a

considerable disintegration from the interpolated lists. The tendency for retroaction to decrease as degree of learning increases applies to serial positions in the list differentially, the position of the maximum amount of inhibition shifting as degree of learning increases.

EXHIBITION OF APPARATUS AND TEST MATERIALS

WEDNESDAY, DECEMBER 28, 4:00 P.M.

ROOMS 110 AND 111, EDUCATION BUILDING

ANNUAL BUSINESS MEETING

WEDNESDAY, DECEMBER 28, 8:00 P.M.

ROOM 321, EDUCATION BUILDING

PROGRAM A

SESSION FOR INFORMAL REPORTS OF GRADUATE STUDENTS

THURSDAY, DECEMBER 29, 9:00 A.M.
COMMERCE AUDITORIUM
KNIGHT DUNLAP, *Chairman*

The Visual Perception of Distance in Young Children and Adults. RUTH UPDEGRAFF, State University of Iowa.

A Study of the Ocular Attitudes Involved in Thinking of Spatial Relations. E. G. STOY, University of Chicago.

Reaction Times and Discriminatory Judgments. ISABEL K. WALLACE, University of Chicago.

Reaction Time as a Measure of Confidence in Recognition. GEORGENE SEWARD, Columbia University.

An Improved Psychogalvanic Reflex Apparatus with Preliminary Findings on Success and Failure Responses. STARKE HATHAWAY, Ohio University.

The Effect of Incentives on Fineness of Discrimination Measures on the Galton Bar. HUGHBERT C. HAMILTON, Columbia University.

The Influence of Punishment for Errors upon the Learning and Retention of Stylus Maze. MARION E. BUNCH, University of Chicago.

Disintegration of the Maze Habit upon Removal of the Food Incentive. W. L. SHARP, University of Chicago.

The Effect of Short Intervals of Delay on Food Seeking Behavior in the White Rat by Means of the Obstruction Method. E. LOUISE HAMILTON, Columbia University.

A Study of Manual Tasks in Relation to their Constituent Units. IRENE L. GLENN, Columbia University.

The Significance of Alcohol in Mental Deterioration. HELEN LOUISE FLINN, Ohio State University.

PROGRAM B

CLINICAL PSYCHOLOGY AND MENTAL MEASUREMENT

THURSDAY, DECEMBER 29, 9:00 A.M.
ROOM 200, PHYSICS BUILDING
F. L. WELLS, *Chairman*

"Genius" and Genetics. RAYMOND R. WILLOUGHBY, Clark University.

An endeavor is made to secure additional information respecting the genetic conditions for the rise of "genius" (term used, for lack of an accurate and equally terse one, for the exceptionally intelligent) from a scrutiny of the data of an earlier experiment by the method of artificial populations. This method, briefly, seeks to reproduce the statistical and other phenomena of real populations in an artificial population in which the individual genetic constitutions are known, and by "breeding" the members of this population in accordance with Mendelian mechanisms to test the validity of the assumptions studied. The present inquiry assumes the applicability of this method; *i.e.*, its results are true only so long as no observations are found inconsistent with the basic assumptions. The emergence of a "genius" in a population is found to depend on: (1) the presence of individuals capable of producing him; this is a function of the

incidence ratios, and it is suggested tentatively that the function, in terms of the individuals *not* capable of producing "genius," varies as the sum of the squares less the inter-products of the incidence ratios of the genes dominant downward. (2) The mating of potential parents of "genius" with other potential parents; this result is independent of the number of genius-producing individuals in existence, which may partly explain an earlier finding that the population mean may continue to increase in the face of a negative fecundity-intelligence correlation, *if* the marital is sufficiently high. (3) The genetic constitutions in the potential genius-producing matings; roughly it was estimated that the probability of producing genius is inversely proportional to the square of the number of heterozygotes involved. (4) Selective survival, of which little is known; it is surmised that genius has a somewhat superior chance for preservation. (5) The fecundity-intelligence correlation, which tends to cause the extinction of genius-producing "stocks." (6) The gene dominances and directions of dominance; analysis of individual ascendance and descendance charts shows the genius stocks emerging, producing, and lapsing, being replaced by others from below. It is surmised that this reflects the probable condition in real populations, and that hence acceptance should not be given to the doctrine of "biological pessimism" without further examination.

Motivational Types as Illustrated by Respiratory Graphs Obtained by a Modification of the Methods Usually Employed for Basal Metabolism Determinations. HENRY E. STARR, University of Pennsylvania.

A standard Basal Metabolism apparatus was employed, so modified as to permit of various degrees of oxygenation—or suffocation—of the subject. By means of the kymographic attachment, permanent graphic records of the respiration of the subject were obtained.

Subjects diagnosed by the usual clinical methods as of decided motivational types were selected. The respiratory graphs were obtained by an assistant who was unaware of the clinical diagnosis.

Three types stand out clearly with high correlation between motivational reactions and type of breathing. They are illustrated by accompanying enlarged photostatic reproductions of the respiratory graphs.

Where there is apparent disagreement between initial diagnosis and type of respiration, the correct differential diagnosis may be ascertained most frequently by further metabolic study.

Some Fallacies Underlying the Use of Psychological "Test." H. M. JOHNSON, Mellon Institute of Industrial Research, University of Pittsburgh.

In science, the word *test* designates an indirect method of measuring a variable quantity, Y, by measuring another variable, X, whose values *determine* the corresponding values of Y. The use of X as a mere criterion of the presence of Y satisfies the general definition.

To infer any particular value of Y, such as Y_1, from its partner, X_1, it is first necessary to find the proper form of expansion of the expression $Y=f(X)$, for it is as essential to know the *manner* in which Y depends on X, as to know that *some* relation of interdependence exists.

If both Y and X are empirical data, the prerequisites to expansion—*i.e.*, definite statement—of the equation of interdependence, is a series of *simultaneous measurements,* made *directly* on Y and X. From the system of paired numbers which express the results of these measurements, the regression-equation can be obtained, along with its index of precision. If either Y or X is not amenable to direct observation and measurement, indirect measurement in terms of the other is impossible. This is true of many X-variables of psychology. The attempt, under such conditions, to picture X as an indirect measure, or "test" of Y, implies a fallacy of the following form:

A third term, *Y,* is introduced, *defined* as a function of X. The reasoning is: (I) $Y = f(X)$, by definition; (II) Assume $Y = Y$; (III) thence, $Y = f(X)$, Q.E.D. The fallacy lies in the assumption underlying premise (II), which is, that when two things are called by the same name they become identical. This proposition is useful in magic, but is confusing in science.

Some twenty major lines of current investigation rest on this fallacy. They range from Fechnerian psychophysics to the so-called "mental tests." To satisfy some of the propositions whose antecedents are similar in form to those of (III), one must say that under certain conditions, a given task produces more fatigue before it is undertaken than afterwards; that a highball produces more alcoholic intoxication before it is swallowed, or even mixed, than afterwards; that 92 per cent of the total quantity of general sleep taken in a night is taken within the first two hours, etc., etc.

In the application of the reduced scores X on the so-called *intelligence tests* to the prediction of performance, Z, in some specific

task, the reasoning takes the form: (1) $Z = f_1(Y)$; (ii) $Y = Y$; (iii) $Y = f_2(X)$; hence (iv) $Z = f_3(X)$. Proposition (iv) is actually derived by direct measurement, within limits of error which are usually large. The introduction of Y and Y as intermediate terms is irrelevant and confusing. Not seldom the tester is no less deceived than the public.

The Absolute Zero in Intelligence Measurement. L. L. THURSTONE, University of Chicago.

1. The discovery which has been verified so far on seven psychological tests is that with uniform conditions of selection there is a linear relation between the absolute variability and the mean test performance of successive age groups. This generalization refers to absolute scaling and not to raw scores.

2. The absolute zero is located indirectly. The absolute variability of test intelligence must be zero when the mean test performance is absolute zero because, in the nature of the case, the variability cannot be negative. The absolute zero is located by extrapolating the above linear relation to ascertain the scale value of the mean performance at which the variability vanishes. That scale value is the absolute zero. It is defined as a distance below the mean performance of any age group in terms of its own standard deviation.

3. Having found the linear relation above described and having located the absolute zero, the following law of variability is a necessary inference: With uniform conditions of selection, the absolute variability in the test intelligence of different age groups is proportional to their absolute mean test intelligence. This law can be stated in terms of relative variability as follows: With uniform conditions of selection, the relative variability of absolute test intelligence of different age groups is constant. These laws refer to absolute scaling and not in any sense to raw scores.

4. By means of the unit of measurement provided by absolute scaling and the absolute zero it becomes possible to construct a true mental growth curve for a specified mental test. It has not hitherto been possible to study the function of mental growth because of the lack of a unit and an origin.

5. The validity of the determination of absolute zero is subjected to a practical test by determining the age at which the mental growth curve passes through absolute zero. It is found that this happens at birth or shortly before.

6. The fact that the mental growth curve passes through absolute zero at or before birth constitutes statistical evidence that test intelligence begins its development at this early age even though it is not then directly accessible for measurement.

Orthogonal Mental Traits. TRUMAN L. KELLEY, Stanford University.

If x is a variable as a deviation from a mean, and if it is set equal to the sum of two others, α and β, such that the sum of the squared variables remain constant, thus

$$\Sigma x^2 = \Sigma \alpha^2 + \Sigma \beta^2$$

then the substitution of $\alpha + \beta$ for x constitutes an orthogonal substitution, and variables α and β have the property of being uncorrelated. In dealing with mental traits we may think of x as the score upon some mental measure or scale, and of α and β as traits or factors which are independent of each other, but which in their totality are the same as x.

The trait x can be thought of as capable of being split up into two orthogonal parts in an infinite number of ways. However, if instead of dealing with one trait we consider several, x, y, z, w, u, v, etc., it may or it may not be possible to set each equal to differently weighed combinations of the same two orthogonal traits; thus

$$x = c_1a + k_1b$$
$$y = c_2a + k_2b$$
$$z = c_3a + k_3b \text{ etc.,}$$

wherein the c's and the k's are constants as one goes from individual to individual, and wherein a and b are uncorrelated variables. If it were possible to set all mental measures equal to two independent basic traits, a and b, say general intelligence and industry, then a knowledge of a and b for any individual would completely define his mental capacity, and a knowledge of the constants c_1, k_1, c_2, k_2, etc., which could be determined once for the entire population, would enable an accurate forecast of performance of the individual, for whom traits a and b were separately determined, in all mental tasks. Though mental structure is not as simple as this, nevertheless the discovery of the least number of factors, a, b, etc., is the basic problem of character and mental analysis, and it is a problem subject to straightforward experimental investigation. The writer has made such a study, dealing with three different populations and thirteen different mental measures. The results on the three populations are highly confirmatory of each other.

Computing the Standard Deviation and Probable Error of a Binet Mental Age. R. S. WOODWORTH, Columbia University.

Though the scatter in a Binet test score has been regarded as important, no good measure of scatter has been suggested, the total range being here, as elsewhere, too inaccurate a measure to serve. But the standard deviation of the scatter can be computed, and from that measure of the probable error of the mental age given by the test. The method, in principle, is to regard the M.A. as the average transition point between success on easier tasks below and more difficult tasks above, and to take the differences between the scores on successive age groups of tests as giving the frequency with which the transition point falls within each year-step. More convenient statistical devices can be employed.

PROGRAM A

SOCIAL AND ABNORMAL PSYCHOLOGY

THURSDAY, DECEMBER 29, 2:00 P.M.
COMMERCE AUDITORIUM
HOWARD C. WARREN, *Chairman*

Common Annoyances: a Study in Social Psychology. HULSEY CASON, University of Rochester.

Annoyances may be conveniently grouped into three classes: (1) physical, such as the ordinary pains, (2) rational, and (3) the learned, not easily predicted, and somewhat irrational annoyances. The present study is concerned with the third class, and the words "annoyance" and "annoy" are used in their most ordinary meanings. The following are examples of "learned, not easily predicted, and somewhat irrational" annoyances: To see an intoxicated man, to hear a person talking during a musical number, to hear a person sucking his teeth, to hear a woman swear, to see a man spit tobacco juice, the odor of a bad breath, and to find a hair in food that I am eating. Many of these situations are very concrete, and the average person has little difficulty in reporting the degree of annoyance which he ordinarily experiences.

The first problem was to ascertain the most common annoyances in everyday life. Several methods were used in collecting annoyances from 659 subjects, who were of both sexes, various ages, different degrees of education, etc. The 21,000 annoyances, including dupli-

cates, were classified and counted; and a list of 507 annoyances was derived from this material. The criteria of selection were as follows: (1) frequency of the annoyance, (2) age distribution, (3) objectivity, (4) universality, (5) permanence, and (6) psychological importance.

The second problem was to study individual differences in 239 of the most prominent annoyances. These annoyances were submitted to 625 new subjects, of both sexes, various ages, different degrees of education, etc. Each subject graded each annoyance according to the following scale:

3—Extremely annoying
2—Moderately annoying
1—Slightly annoying
0—Not annoying
X—Have not been in situation

The results show the way each of the 239 annoyances varies for each sex throughout 12 age groups spanning the years ten to eighty-nine. Average scores were obtained for different groups of annoyances. The average irascibility score for each subject was also calculated, and these measures were used in studying the relations between the strength of common annoyances and several factors, among which were the following: height and weight, physical health, single and married people, number of years married, number of children, ages of children, occupation, and formal education.

The Measurement of Social Intelligence. F. A. Moss, George Washington University.

One of the primary requisites for success in life is social intelligence, or ability to get along with people. A test has been designed for measuring this ability, and given to 12,000 people, including both industrial and school groups. Among the traits necessary for making satisfactory social contacts are: judgment in social situations; memory for names and faces; keenness in observing human behavior; ability to recognize mental states from facial expressions; understanding of the motives behind the spoken words; and information concerning topics of social interest. These traits were measured separately in the tests.

The reliability of the Social Intelligence Test has been checked by two different methods. First, by correlating scores on the same form of the test given four months apart to 100 college sophomores, a correlation of .89 was obtained. Second, using the papers of 129 persons, the odd and even questions were scored separately. These

scores were then correlated. The final reliability coefficient for the whole test as predicted from the chance half correlation by using the Spearman Prophecy formula (Brown's) was .88.

In spite of the difficulty which is always encountered in attempting to find any satisfactory criteria against which to check social traits, especially traits involving ability to get along with people, the validity of the test was measured in several ways. A group of 98 employees in a large sales company, who had taken the Social Intelligence Test, were rated by superior executives on a seven point scale on their ability to deal with people. The correlation between the Social Intelligence Test scores and the ratings was .61. The extent of extra-curricular activity was one of the criteria selected with which to compare the scores of college students. In a group of 262 college students the median score of those engaging in no extra-curricular activities was 99; the score for those participating in one activity 105; for those taking part in two, 110; for those in three, 112; and for those in four, 116. The test seems clearly to be measuring something important in determining participation in campus organizations and activities.

A positive correlation has been found in all cases between social intelligence and abstract intelligence. Some of these correlations are as follows: Thorndike Intelligence test and Social Intelligence test, .42; George Washington Mental Alertness test and Social Intelligence test, .54; McCall Multi-Mental and Social Intelligence test, .25; and Pintner Classification and Social Intelligence, .30.

The Origin of Language. KARL BUEHLER, University of Vienna.

Older theories like Darwin's, Spencer's, and Wundt's started from individual psychology. Beginning with the situation of social contact the theory of the origin of language can be systematically developed.

In every organized group we observe a mutual steering of the behavior of the individuals. There are many cases where such a mutual steering is possible without the means of significations. That can be done wherever A can understand from what he immediately perceives the behavior of B and *vice versa.*

But suppose that the goal of B lies beyond the horizon of A's perceptions then, as a general rule, signals are necessary. Take this "beyond the horizon" first in a literal and then in a figurative sense and you have a good and satisfactory formula for the origin of language as well in animals as in man. Consider the situation of

human car drivers and look at the facts we know, for instance, about the so-called language in ants and bees, the origin of signals is in general always the same.

The Measurement of Aesthetic Sensitivity. NORMAN C. MEIER, University of Iowa.

The investigation reported herein is an attempt to devise an objective measure of aesthetic sensitivity, using the term in a perceptual sense rather than sensory, and defining it as responsiveness to traditionally correct aesthetic structure. Experimentation and previous studies indicated superiority for the selection method over the production method; also, for the single variant of aesthetic sensitivity or judgment over all others as prognostic of art talent.

Ten-variation exhibits were constructed, in which nine drawings were varied slightly from the original, producing nine degrees of aesthetic value. This was reduced to five-variation and finally to two. The laboratory form contained fifty two-variation exhibits and ten five-variation. A flexible scoring system was used allowing weighted values for the latter. The present form contains over 175 two-variation exhibits, constructed by artists and reduced photographically to approximately uniform size and mounted in albums so that but one is displayed at a time. A single element in the composition is varied, the remainder is identical in both. To save time an accompanying sheet stating just what is altered is supplied the subject.

The theoretic bases of the technique are that aesthetic principles are pragamatically permanent, genetically time-tested, and hence constitute a datum of reference; that good art works by masters embody and exhibit these principles; that in using such a basis for controlled-alteration problem-settings there is provided a dependable criterion of rightness; and that in the response of subjects is afforded a quantitative measure of aesthetic responsiveness, here taken as the most significant item in the art-talent complex.

Intelligence and Suggestibility in Whites and Negroes. PAUL CAMPBELL YOUNG, Louisiana State University.

In this group experimentation using 638 nine and ten-year-old school children of the third grade and above, 330 whites and 308 Negroes from the same wards of two Louisiana cities, the test materials were the National Intelligence Tests, Form A, two series

of (modified) Binet lines used as a test for suggestibility, and three suggestibility tests devised by the writer. With the aid of the Negro principals and teachers, the Negroes were divided into two classes: all the darker, more Negroid in one class, the lighter, less characteristically Ethiopian, in the other.

The writers' tests for suggestibility included the following: (1) Sample Test, which began with six examples such as "All men are blind" ("No"), "We should obey our parents" ("Yes"), for the purpose of establishing a set for "Yes-No," and twelve such items with blanks to be filled alternately with "yes" and "no"; (2) Form X, with six examples of the alternating "Yes-No" type, followed by twenty-five statements of which only the first six were in alternate order, the rest demanding "No" for the correct answer; (3) Form Y, a variation of Form X; (4) Form Z, which sought to establish an "Is-Are" set, which the suggestible should preserve in spite of all the demands of grammar. Words of Germanic origin helped keep the illusion.

In brief, the results show that the average intelligence score for 282 whites was 72.12, for 277 Negroes 40.04. It is to be noted that even with these comparative scores, the proportion of nine-year-old children taking these tests is considerably greater among the whites than among the Negroes. As judged by scores on the Binet lines the Negroes averaged about one and three-fifths more suggestible than the whites; as judged by Forms X, Y. and Z, scores combined, the Negroes were one and one-third more suggestible. That this marked difference in suggestibility does not depend solely on the difference in intelligence or on ability to read is certain from the fact that within the Negro group there is no correlation (intelligence and lines) or a very low correlation (coefficient of 20 between intelligence and X-Y-Z) between intelligence and the ability to throw off suggestions; whereas, among the whites there is a correlation of 50 between intelligence and suggestibility as tested by X-Y-Z, and a correlation of 33 between intelligence and suggestibility as tested by the lines.

In addition to the clear cut differences in intelligence and in suggestibility between whites on the one hand and Negroes on the other, there were significant differences in *intelligence* between nine-year-old whites (average score 63.26) and ten-year-old whites (average score 79.92), between nine-year-old Negroes (average score 32.52) and ten-year-old Negroes (41.00), between light Negroes (44.48)

and dark Negroes (37.19). Contrasted with these differences in intelligence, the tests showed no marked differences in suggestibility between nine- and ten-year-old whites, between nine- and ten-year-old Negroes, between even the light and dark Negroes. That the light Negroes averaged 19 per cent more intelligence than the dark Negroes and yet were equally suggestible may be explained by the hypothesis that their white blood makes them more intelligent but that their environment makes them fully as suggestible as their darker fellows.

A Case of Automatic Writing by a Blind Subject. SARAH M. RITTER, Wesleyan College, Macon, Georgia.

A man of sixty-five, blind from the age of two and one-half years, began after considerable reading of occult literature to "receive messages" from his deceased wife through his own automatic writing. He claimed to have no knowledge of the alphabet, save only a partial list of the letters which he made by conscious effort in a form very different in most instances from that used in the automatic script. Specimens of both types of his writing accompany the paper.

These specimens are shown for their intrinsic interest. But attempted explanations should weigh such efforts as the following:

1. The suggestibility of the subject played upon by its reading and by the members of his household.

2. Possible faint recollections by the subject of childhood experiences with blocks having raised letters.

3. The possible ouija-like performance of any human hand relaxed and placed at the disposal of the so-called co-conscious or the direction of a second person in the rôle of experimenter.

4. The question of "habit" or "consciousness"—epiphenomenal or causal—in a chain of abnormal events.

Why Some Motormen Have Collisions—An Investigation in the Interest of Safety on a Metropolitan Street Railway. W. V. BINGHAM, with the coöperation of C. S. SLOCOMBE, Personnel Research Federation.

The operation of a street-car under present conditions of congested traffic and of public demand for speed obviously calls for quickness and skill of manipulation of controls, coupled with superior judgment of distance and speed of moving objects in traffic. It also demands both ability and willingness of the motorman to hold his attention strictly on the job. He must, by temperament, be capable

of keeping his head in a sudden emergency and doing the right thing under conditions of surprise. Tests for selection of candidates who excel in these regards have been helpful in reducing accidents in Paris, Berlin, Prague, Milwaukee, Philadelphia and elsewhere. But initial selection is only a step toward safe operation. The problems arising during training and in the course of the operator's varied experience, also call for detailed analysis and individual treatment.

Among the older and more experienced employees of the metropolitan railway where this study was made, half the accidents happen to only a fifth of the motormen. Among this relatively small group of prone-to-accident men have been found some whose poor record involved repetition of some particular type of accident, traceable to a single erroneous habit of operation, easily remediable, but of which apparently neither operator nor supervisor had been aware. One significant association disclosed was that between susceptibility to accident and physical condition as indicated by high blood-pressure. A different sort of disturbing factor was a change in astigmatism which interfered with vision in one part of the field. Safe operation was found to be associated with skill in saving electric power as measured by automatic coasting recorders attached to the street cars.

Among the most illuminating aspects of the investigation are the results of individual studies of men involved in serious accidents and of their behavior in relation to current practices and rules of operation.

This paper reports some results of studies being made on behalf of a metropolitan street railway by the staff of the Personnel Research Federation, under the immediate supervision of Dr. C. S. Slocombe.

PROGRAM B

EDUCATIONAL PSYCHOLOGY

THURSDAY, DECEMBER 29, 2:00 P.M.

BIRD T. BALDWIN, *Chairman*

A Demonstration of Suggestion and Involuntary Imitation for the Classroom. W. S. TAYLOR, Smith College.

This simple demonstration has been found helpful in connection with classroom discussions of ideomotor action, suggestion, imitation, and some allied topics. No apparatus is required, except that a device such as the *pendule explorateur* is useful in a preliminary

way. But of course the details of the procedure require some care, as indicated in the paper.

After acquainting the students with the actuality of ideomotor action, as by means of a *pendule*, the rôle of set or expectation in predisposing to an overt response, particularly when the attention is otherwise engaged, is demonstrated by having the students ready to bring their uplifted arms down the instant they hear a sudden loud noise, producing this noise when they are still in a position of readiness but actively thinking of something else. Their unreflective response to this situation acquaints them with the way suggestion works; and incidentally it prepares for the demonstration of involuntary imitation which follows. This demonstration consists in having a few students understand that they and all the rest of the class are together to bring their arms down when a certain signal is given. Instead of this signal being given, however, another one, understood by all except the few students mentioned, serves as a signal for the majority present to bring their arms down voluntarily. The involuntary imitation is evident in the few who had been waiting for a different sign.

Similar phenomena from every-day life are cited, and factors entering into their explanation considered.

Emotional Sex Differences in College Freshmen as Indicated by Accumulative Error Scores and Comparable Measures. JAMES P. PORTER, Ohio University.

The material used in this study has been selected chiefly from The Ohio State University Psychological Examinations, Forms 9 and 10. One hundred and twenty freshmen papers, sixty women and sixty men, were chosen alphabetically from three percentile levels—0–10th, 45–55th, 90–100th. Problems in Mental Arithmetic, Same–Opposite, Grammatical Relations, Number Series Relations and Paragraph Meaning totalling 400 constitute each of these examinations.

The total errors divided by the number of groups into which they fall is our accumulative error score. The accumulative accuracy score is similarily computed. Percentage of omissions is the number of attempts including omissions divided into the number of omissions.

With Allport we have assumed that many subjects recognized immediately their errors, were conscious that others were probably solving problems correctly. Recovery of composure would be delayed,

and error would follow error. Accurate responses should function emotionally in making success follow success. Percentage of omissions is assumed to indicate often caution and fear.

The percentages of men equaling or exceeding the women in both the accumulative accuracy and error are sufficiently great to suggest further work with larger groups. In percentage of omissions 90 per cent of the men equal or exceed the median of the women. Though not invariably true our findings would confirm earlier ones as to the superiority of men in mathematical and women in linguistic material. Our men as a rule work more accurately, the women more speedily if number of items covered is the speed measure.

The Standard Deviations of the Cumulative Accuracy score, the Cumulative Error Score and percentage of omissions when divided by their means or averages in each case show that the men are much more variable in Form 9 and only slightly so in Form 10.

The sex differences revealed in this study are sufficiently marked to suggest more discriminating and objective construction and application of tests and test scores. While the school may adequately recognize sex differences in ability by taking account of individual differences, such does not yet follow for the emotional differences nor does it follow for older subjects as for children.

A Uniform Test of General Intelligence. J. C. PETERSON, Kansas State Agricultural College.

The value of most mental tests for literates is seriously limited by their temporary, local and class character. This test is an attempt to avoid these and other common limitations of our conventional tests and yet preserve a satisfactory standard of reliability and validity.

The test consists of numerous repetitions of a few types of response, namely, the completion of simple equations from which all the signs of addition, subtraction, multiplication, and division are omitted in the test blanks. This form and content should make it possible to obtain comparable results in all countries where the Arabic numerals are taught and to establish standards with which comparisons may fairly be made in future generations. The test is suitable for use at any age from junior high school through college and probably on into old age with proper precautions as to preliminary practice and motivation.

This test has been used with slight modifications as a college freshman test at Kansas State Agricultural College since 1922. The reliability coefficient based on correlation of scores obtained in two successive ten-minute periods after ten minutes of practice is .856. Based on two thirty-minute periods without preliminary practice the reliability is .938.

That the validity of the test is probably up to standard is indicated by the fact that in three of the four divisions (schools) at Kansas State Agricultural College the scores of a forty-five-minute equation completion test preceded by fifteen minutes of practice, correlate more highly with scholarship ratings than do those of the Thorndike Intelligence Examination for High School Graduates, Parts I and II combined.

Capacity Tests in the Field of Achievement—A Phonetic Spelling Scale. J. E. W. WALLIN, Miami University.

A serious limitation of the ordinary standardized achievement tests is that they do not measure native educational capacity, but only educational attainment levels at the time of the test. To determine the child's potential educational ability by existing tests it is necessary to subject him continuously to appropriate processes of instruction, and then periodically test the results thereof. This learning-by-trial method is time consuming. We need batteries of tests which will reveal the presence or absence of the specific mental, social, moral, and physical traits on which success in various branches of the curriculum depends, so that predictions may be made regarding the child's educational abilities and disabilities, and so that the instruction may be adjusted to meet individual needs.

To construct tests of this type, which are now almost nonexistent, will require a searching analysis of the learning processes involved in all types of subject-matter. While the phonetic spelling scales reported by the writer are not based upon an analysis of the sensori-motor and intellectual components of spelling capacity, it is believed that a test consisting of phonetic words probably will constitute a better test of inherent spelling capacity and a better predictive measure of potential spelling ability than would a test of nonphonetic words.

The phonetic scales are submitted with the expectation that they will provide better measures of spelling power than the existing non-phonetic or mixed scales.

Analysis of Scholastic Motivation. EDWARD S. JONES, University of Buffalo.

The "personnel" psychologist is urged to give more than a college Freshman's I.Q. or capacity in a Content Examination; he is asked, why does a boy fail, or how can the college motivate him to his maximum capacity. The lax standards of a high school, one of many kinds of "spoiling" in the home and the absence of discriminative encouragement is the usual trio of causes of poor accomplishment. The obvious, but badly neglected basis for restimulation is through habit formation. Shattering "complexes" does not take its place.

The two fields of habit deficiency common to almost all students who have done poorly in high school are rapid reading with comprehension and note taking. Both of these activities yield readily to appropriate drills, showing average improvements of 50 per cent or more in three weeks' time. Progress in both may be measured and defects very specifically pointed out. Moreover they both involve a bolstering of that vague but often sought "concentration of attention." In a system of "how to study" exercises built around these two drills and the writing of themes, an *educational conversion* can be effected, which generates drive and bolsters self-regard. Of those graduating from the lowest two-fifths of high school classes and entering the college (the University of Buffalo) the percentage of those entering the Sophomore class the following year in good standing was raised from 43 per cent to 72 per cent under such a system. This salvaging is in part due to the improvements in the two habits above mentioned, but also to a spread of confidence on account of these habits into other channels. The excusing of men because of high intelligence scores is just as unfortunate as the acceptance of the very dull who may have been subjected to such a drill.

Finding Mistakes Versus Correct Association in Learning Improvement in Arithmetic. GARRY CLEVELAND MYERS, Western Reserve University.

Attempt was made to measure the relative efficiency of two methods of learning practice in simple arithmetic processes—one of finding mistakes, the other of studying correct associations.

Two hundred fourth and fifth grade children were studied individually. Half were given one practice in finding mistakes and half, one practice in making correct associations. In a given schoolroom

the names of the pupils were arranged alphabetically and from that order the pupils were selected alternately, one to be exercised by the *find mistakes* method, the other by the *correct association* method. All children were tested in the same manner before and after the "learning" exercise. Accordingly each pupil was given a printed sheet of twenty problems like 15−3, 6×4, and 7+15, to which he gave answers verbally, the experimenter recording answers and time. The mistake-finding pupil was next given a printed sheet and told that these problems were answered but that some answers were right and some were wrong, and that he should draw a circle around those answers which were wrong. The correct-association pupil was given a printed sheet and told that all the problems were answered correctly, and that he should study them once carefully. Another group of 25 pupils was given the verbal test twice without either "learning" exercise in between.

Although there were wide individual differences, in general those who had the correct association exercise gained more time (and almost never lost time) than those without any intervening exercise, and gained very much more time than the pupils exercised in finding mistakes. From fifteen to fifty per cent of the mistake-finding pupils lost time and they took far more time to find the errors than it took the other children to study the correct associations. The reduction of errors was also in favor of the *correct association* method.

So far as learning improvement in such simple arithmetic processes is concerned the widely used method of having pupils find mistakes seems to be a very wasteful method.

Significant Factors in the Motor Coördination of Young Children. BETH WELLMAN, Iowa Child Welfare Research Station.

The special factors in the motor coördination of young children considered are:

(1) The relative ease and control of movements toward the body compared with movements away from the body, and the bearing of these findings on neurological theories of movement. Approximately 8,000 individual records in eight directions of movement on a tracing path experiment by 136 children from three to six years of age were analyzed. No significant differences were found that would justify either the rather prevalent belief that inward movements are easier to make than outward movements, or the consequent neurological explanations.

(2) The influence of sequence of movements on accuracy. This factor has not adequately been taken into account heretofore. Analysis of the records and of additional records when four selected movements were given in a different order, shows clearly this influence. The study is being continued with a still different sequence.

(3) The effectiveness of self-initiated activity in the use of play apparatus as training in motor coördination. Daily observations were made of the children's use of the play apparatus, and four tests of motor coördination, the tracing path, a series of walking boards, strength of arm pull, and a target board, were given at an interval of two months to three groups of preschool children. The group which had daily access to the play apparatus made significant gains in all of the tests excepting the target board; the control groups not having access to the play apparatus did not make significant gains.

ANNUAL DINNER

THURSDAY, DECEMBER 29, 6:30 P.M.

FACULTY CLUB

ADDRESS OF THE PRESIDENT

SENSUOUS DETERMINANTS OF PSYCHOLOGICAL ATTITUDE

H. L. HOLLINGWORTH

BARNARD COLLEGE, COLUMBIA UNIVERSITY

THURSDAY, DECEMBER 29, 8:00 P.M.

FACULTY CLUB

PROGRAM A

ANIMAL AND COMPARATIVE PSYCHOLOGY

FRIDAY, DECEMBER 30, 9:00 A.M.

COMMERCE AUDITORIUM

WALTER S. HUNTER, *Chairman*

Direction Orientation in the White Rat. J. F. DASHIELL and J. C. BAGWELL, University of North Carolina.

Earlier experimental work has suggested the possibility that white rats operate with some direction-orientation function when learning

a maze problem. In the study here reported the animal's direction activities were given more immediate observation. A multiple-choice maze design was built up of open alleys affording numerous alternative pathways in many directions. Rats motivated by hunger were used in daily trials. On the very earliest trials the rats showed randomness in high degree, but "learning" after a few trials to get to the food exit with few or no errors (*i.e.*, turns away from direction of food exit). This learning seemed not to be a learning of *specific* runs and turns, nor even a learning of a definite *pattern* of runs and turns, but—in some form—a learning of the *direction* of the food. This appeared from the fact that, once an animal had made one or a few errorless runs, it would on successive trials continue to make errorless runs—but these runs would vary greatly one from another. The problem arises: How can an animal run along entirely new pathways and at the same time remain oriented to its ultimate objective?

Visual cues were checked by rotations of the maze, by rotations of the position of the experimenter, by shuffling the unit materials of which the maze partitions were constructed, and by rotation of the pattern of partitions upon the maze floor. Olfactory cues were checked by the last two changes mentioned, by blowing across the maze from one side air drawn from an extra food box, and by changing the position of the food box to one side of the maze. Auditory cues from the food box were absent, because all animals were removed therefrom.

That the directional function is dependent upon the orientation established upon first entrance to the maze is indicated by a series of control experiments in which the entrance alley was pointed toward one side of the maze, whereupon the rats veered definitely to that side.

An Experimental Study of the Development of Behavior in Vertebrates. LEONARD CARMICHAEL, Brown University.

The study here reported is a continuation of work already published by the writer on the development of behavior in the frog and salamander. The experiments are devoted to the study of the relative influence of heredity and environment in the development of behavior. Much previous work, such as that upon hooded chickens, has neglected the activity and conditioning that occurs before birth and hatching. In the present experiments salamanders were raised from an early and immobile embryonic stage in such a manner as to

strictly limit the possibility of environmental stimulation and response. This limitation was accomplished by allowing the organisms to develop either under an anesthetic or to grow in a specially adapted isolation chamber. The results show that development of behavior occurs without constant and continuous response to external stimulation. A knowledge of the developmental mechanics of the nervous system, however, precludes the use of these results as a final confirmation of the theory that the development of behavior is merely a nonenvironmentally determined maturation of native factors.

Temporal Discrimination in the Monkey. HERBERT WOODROW, University of Oklahoma.

Five rhesus monkeys were employed in two investigations dealing with temporal discrimination. The first was designed to test the ability of monkeys to discriminate between short, empty intervals of time, bounded by hammer-beats. The second aimed to determine their ability to distinguish groups of successive sounds according to the number of sounds in the group, that is, in a sense, their ability to "count." In both cases, the discriminatory reactions, which were always "delayed" reactions, consisted in reaching into a can for food after one stimulus of a pair was given and in inhibiting that response after the other was given. The investigations took the form of learning experiments and were continued until the approximate limits of discrimination were reached, a total of over 30,000 trials being given.

In the work on discrimination of intervals, the two monkeys trained acquired the capacity to discriminate, to the extent of 75 per cent correct responses, between the standard interval of 1.5 seconds and an interval about two-thirds of a second longer than the standard. Considerably smaller differences, however, in the intervals discriminated yielded behavior showing a differentiation reliably better than chance.

In the experiments on discrimination between groups of varying numbers of sounds, the three monkeys which were used exhibited individual differences in achievement. All learned to discriminate between two and three sounds; two monkeys learned to distinguish reliably between three and four sounds; and one gave evidence of differentiating between four and five sounds.

In learning to discriminate between three and four sounds, the monkeys showed a transference of ability from their previous train-

ing. This transference occurred in spite of the fact that in the discriminations of three from four sounds the correct reaction to three sounds was to refrain from reaching into the food can, whereas in the previous training the correct reaction to three sounds was the opposite, that is, to reach out and obtain food.

Statistical considerations led to the suggestion of a treatment of the data which, it is believed, portrays the course of practice more adequately than the ordinary learning curve showing simply the increase in the percentage of successes.

Since the discriminatory task of the monkeys involved a conflict of opposing tendencies, interesting qualitative changes in the manner of reacting appeared during the course of learning. These changes were pronounced and showed certain general tendencies common to all the monkeys.

Mnemonic Processes in the Chimpanzee. ROBERT M. YERKES, Yale University.

The method of delayed response has been used to exhibit in the chimpanzee appropriate response after delay of some hours. Anticipatory responses have also been demonstrated. The animal is capable of responding either to total visual configuration (including positional factors) or to the single visual datum of color. Thus far the types of adaptive behavior referred to have been discovered only in certain of the primates. The findings markedly accentuate the psychobiological resemblance of the chimpanzee to man.

The Study of Cerebral Inhibition in the Sheep by the Conditioned Reflex Method. H. S. LIDDELL and T. L. BAYNE, Cornell University.

Pavlov and his collaborators have been engaged for twenty-eight years in the systematic analysis of the dog's behavior, employing the method of conditioned salivary and motor reflexes. Most of their data awaits verification in other laboratories and with other animals. The writers have undertaken a program of research, the aim of which is two-fold: first, to repeat Pavlov's fundamental experiments with mammals possessing a different type of cerebral organization—the sheep and goat; and second, to compare directly the results obtained by the conditioned reflex method with data from the other common animal learning methods. Because of the more or less constant secre-

tion from the parotid glands of the goat salivary reflexes have been neglected in favor of the motor conditioned reflexes.

The leading concept of Pavlov's complex theory of cerebral activity is cortical inhibition. He recognizes external and internal inhibition, and of the latter type four varieties. We have demonstrated the following varieties: extinctive inhibition and the inhibition of delay. The latter develops with great difficulty in the sheep, and in one case led to an abnormal condition similar to certain " experimental neuroses " observed by Pavlov. The course of recovery from this " neurosis " has been carefully followed. The differentiation of various rates of the beating metronome is being attempted and the results will be presented. Data on maze learning in the sheep have suggested that extinctive inhibition plays an important part in the elimination of *cul de sacs*. Consequently this factor must be considered in the interpretation of curves of learning.

Conditioned Psychogalvanic Responses in Infants. HAROLD ELLIS JONES, University of California.

A technique was developed for obtaining kymographic tracings of the P.G.R. in infants, employing a D'Arsonval galvanometer (Wechsler) and electrodes of Kaolin-NaCl over silver foil. In a preliminary study of infants under six months of age, it was found that characteristic deflections could be obtained by (1) cutaneous pain stimuli, (2) withdrawal of the bottle during nursing, (3) confinement of normal arm-leg activity, (4) loud sounds. No responses could be elicited to visual stimuli, nor to situations that would ordinarily be inferred as " indifferent " or " pleasant."

Initial skin resistance was in every case much lower than in corresponding experiments with adults, and the psychogalvanic excursion was smaller in degree; a potentiometer and wheatstone bridge were used in standardizing the exosomatic current in relation to the subject's resistance. Within certain limits, overt movement and P.G.R. tended to show an inverse relationship; loud sounds which provoked a P.G.R. often inhibited arm-leg activity, but if the stimuli reached an intensity to produce crying (with or without thrashing movements of the limbs) the galvanic deflection usually failed to appear. The phenomena of latent period, adaptation, and restoration of specific response after an interval, were similar to those found in adults.

Conditioning experiments were conducted with three infants over a period of four months, the infants being under twenty-four control

in an experimental home. Previously indifferent stimuli (cutaneous, auditory, and visual) were associated with skin stimulation from an inductorium. A P.G.R. to the substitute stimulus was elicited after from four to fourteen associations with the unconditioned stimulus. Repetition of the substitute stimulus alone resulted usually in a quick exhaustion of the response, which, however, would reappear the following day without further conditioning. Conditioning was shown to survive four weeks in one case, and six weeks in another, after the unconditioned stimulus had been removed from the schedule. From the standpoint of technique, it is significant that the overt behavior of the infants showed no correlated effects; the evidence for conditioning was derived entirely from the instrumental records.

Differential Punishment in Stylus Maze Learning. CLARK L. HULL, University of Wisconsin.

The problem at issue is whether punishment will be more effective in leading to the elimination of errors in trial-and-error learning when applied to the part of the organism active in performing the erroneous act or when applied to a corresponding nonactive part.

The apparatus is a bakelite stylus maze with twenty-four *culs de sac,* each having at its end a metallic section which closes an electric circuit when touched by the stylus. Half of the alleys were wired to give a mild electric shock to the wrist of the hand manipulating the stylus, half to the other wrist.

The division of the alleys was made on the basis of results from a preliminary squad of twenty subjects. Sixty subjects were used in the main experiment. The grouping of the alleys was reversed on the second thirty subjects from that of the first thirty to further equalize inherent difficulty of the groups of alleys.

It was found that the alleys which shocked the active hand were learned with 6.9 per cent less errors than those shocking the nonactive hand, the statistical reliability of this difference being high. Implications of the results for the theory of learning will be presented.

PROGRAM B

CLINICAL PSYCHOLOGY AND MENTAL MEASUREMENT

FRIDAY, DECEMBER 30, 9:00 A.M.
ROOM 200, PHYSICS BUILDING
L. L. THURSTONE, *Chairman*

The Mind of the Rural Child. BIRD T. BALDWIN, assisted by EVA FILLMORE, State University of Iowa.

Are there differences between the mental traits of rural children and of city children?

In order to investigate this problem a study was made of all children from birth to sixteen years of age in four rural communities in Iowa in which children attend one-room schools or consolidated schools and of a control group in an Iowa city with a population of 15,000. The method of investigation included verbal and nonverbal intelligence examinations and educational tests, together with a study of the school and home environment and community attitudes, interests, and traditions.

When compared in intelligence with children at large, by means of established norms supplemented by a detailed analysis of each test and when matched with city children, the rural infants show no noticeable differences; the rural preschool children show some inferiority at the upper ages; and the rural school children show mental retardation that becomes increasingly apparent as they progress through school. When the comparison is made between the children within the various rural communities, the infants rank approximately the same, the preschool children differ somewhat, but the school children show decided differences. In one of the communities the general average of intelligence is 13 per cent lower than that of another. The differences between the results of intelligence examinations of children at all age levels in consolidated and one-room schools are also found to be statistically significant. An analysis of the results of verbal intelligence tests reveals a striking weakness in the language ability of rural children in contrast to city children. An analysis of the nonverbal reactions to the performance tests shows that while the rural children are handicapped by a slower rate of action, they show superiority on certain tests that probably relate to their experiences.

These results raise fundamental questions: Are there inherent differences between the mental traits of rural children and of city children? Are the differences that have been found due to develop-

ment and environment? Or are any of the present tests for measuring traits and their development adequate for rural children?

A Study of the Effect of Environment on the Intelligence of Foster Children. FRANK N. FREEMAN, University of Chicago.

The chief difficulty in the study of the effect of environmental influences on mental ability has been that variations in environment are, or may be supposed to be, associated with differences in heredity. In this study these two factors are in a measure dissociated, due to the fact that foster children are introduced into an environment other than that which surrounds their natural parents.

The effect of the new home environment was studied in various ways. In the case of a small group on whom test scores were available before and after adoption, a definite improvement in intelligence test score was found. Again, the resemblance between true siblings placed in different homes was found to be considerably less than when they live in the same home, whereas totally unrelated children who had been brought up in the same foster home were found to have a marked resemblance in intelligence. In general, a marked correlation, amounting to $.48 \pm .03$ for the entire group of 401 children, was found between the intelligence of foster children and the grade of the foster home, as measured by means of a home rating score card. The school achievement of the entire group of foster children was found to be above the average and their conduct presents a shining contrast to that of their natural parents.

Techniques for Testing Inhibition in Children. MARK A. MAY, Yale University.

Two batteries of tests designed to measure certain forms of inhibition or self-control have been developed by the Character Education Inquiry at Teachers College, Columbia University.

The first is a battery of seven group performance tests covering four kinds of situations. Situations 1, 2, and 3 were covered with two tests each, and situation 4 with one test.

Situation 1. An interesting story is presented up to the climax. Can the desire to know the ending be inhibited?

Situation 2. A small interesting object is placed before and within easy reach of the subject. Can he inhibit the tendency to handle or manipulate it?

Situation 3. Distracting visual stimuli are presented on the same

page with problems in simple addition. To what extent will these distractions reduce the speed and accuracy of adding?

Situation 4. A small box of assorted candies and nuts is placed open, in full view, and easy reach of the subject. Can he inhibit the tendency to eat before the stated time?

The second battery contains seven individual performance tests. Each consists of a stimulus to which certain observable responses are ordinarily made and the test is whether or not the subject can inhibit the usual response. In tests 1 to 5 the response to be inhibited is any facial change.

Test 1. *Tactual.* A feather is drawn slowly three times across the back of the neck from ear to ear.

Test 2. *Olfactory.* An offensive odor is held close under the nose with the instructions to take three long smells.

Test 3. *Taste.* An unpleasant tasting substance is placed on the tongue for two minutes.

Test 4. *Visual.* A scrapbook containing fifty-three assorted comic pictures is presented with the instructions to turn slowly through the book and look at each picture.

Test 5. *Visual-auditory.* A wheel that makes a grating, rasping noise and at the same time emits harmless sparks is operated six inches in front of the subject's face.

Test 6. *Gustatory.* Same as situation 4 above.

Test 7. *Pain.* The subject's index finger is placed in the Whipple pain balance. The score is the amount of pain he is willing to stand after he reports that it feels uncomfortable.

Battery I has been given to 275 children and battery II to 25 children. Test score has been correlated with one another and with age and intelligence.

Investigations in the Memory of Subnormals. THORLEIF G. HEGGE, Norway.

A simple story in which animals act like human beings, but generally in accordance with the experience of everyday life, was read to more than one hundred boys. Subjects were tested by questions which might be answered by single words or signs.

Correlation between test scores and mental ages was $.757 \pm .0289$. Extraordinarily high scores indicate valuable verbal or imaginative memory which on account of general mental level might escape attention. Children who profit very little from ordinary school training

may profit much by repeated testing. This trainability might be made useful to the child.

Total failure was not stated above M.A. 5.3 and seems improbable above M.A. 4.5. Memory answers occur at M.A. 3.5 but seem improbable below M.A. 4.5. Very good scores corresponding to median score of M.A. 7 to 8 occur at M.A. 4.5. So M.A. 3.5 to 4.5 constitutes a level from which remarkable improvement can be expected. The next level seems to be at M.A. 7.

Many wrong answers were meaningless because:

(a) The question, or a previous question, or some previous answer, or some previously reproduced ideas prevail and prompt the reply.

(b) A new idea which may belong or which may not belong to the story absorbs the interest and prompts the reply.

Type and number of meaningless answers correspond to scores and mental ages. Ecolalia (two last words of the question) and Yes as irrelevant answers are typical for M.A. 3.5 downwards. Repetition of other words or ideas of the question itself occurs mainly between M.A. 3.6 to 6.9, several higher types from M.A. 3.6 upwards and above M.A. 7.

Considering also the number of meaningless answers, we find: from M.A. 3.5 downwards only low grade, from 3.6 to 6.9 middle grade and high grade, from 7 upwards only high grade reactions. Within the second group mental age is not decisive for qualitative type of reaction. Finally very low grade reactions go with very low grade scores, very high grade reactions with very high grade scores.

Children below M.A. 4.5 seem not likely to profit from stories; between M.A. 4.5 and 7 they may profit, especially from repetition. From M.A. 7 upwards they are likely to profit as far as memory and comprehension is a condition for this profiting.

The Clinical Study of Normal Children. FLORENCE MATEER, Columbus, Ohio.

The anxiety of normal adults concerning the normality of their offspring is a matter of recent development. Out of it has developed a new phase of clinical psychology, that is, the mental hygiene examination of normal children in order to make the most of their potentialities instead of dealing merely with their deficiencies as earlier clinical work did.

A study of 500 consecutive examinations on normal children indi-

cates a tremendous need for such work. The ordinary intelligence test with its forthcoming mental age is of almost no value in such work. Tests which indicate the variability of the child, his individuality, his learning capacity, his special interests, his neuromuscular control, and his fatigue or vitality condition are especially valuable.

Out of 100 preschool children examined, all of whom tested at a normal or superior level, only eleven were without some peculiar or special individual problem that needed readjustment. Many of them need analytic aid, and this can well be given as a part of their educational regime, without any development of self-consciousness on the part of the child, and with no recognition of the fact that he has been a "problem child."

With older children one of the most variable conditions seems to be the learning type. Once this is recognized, school difficulties and resultant mental conditions are frequently solved in a few hours of indirect work.

Throughout all ages the most important factors in producing behavior and mental disturbances in the normal child seem to be nutrition disturbances such as iodine or calcium deficiency, specific infection of a congenital type, chronic fatigues, and true mental problems of an analytic nature.

The true test of a normal child seems to be his ability to eliminate his own problems quickly, once they are pointed out to him. As a result, preventive clinical work with normal children is rapid, shows maximum results for the work done, and the results persist over maximum periods of time.

A Clinical Test to Determine Emotional Trends and Emotional Balance. CLARA H. TOWN, Children's Aid Society, Buffalo, N. Y.

This test consists of eighty described situations, ten designed to elicit fear, ten to elicit disgust, ten curiosity, ten anger, ten tenderness, ten sociability, ten self-esteem, and ten self-depreciation.

In planning the test we rejected the method of staging in the laboratory actual situations to produce emotion for two reasons: first, because our previous experience with such attempts has led us to conclude that such laboratory stimuli, on account of the total laboratory situation, are necessarily so far removed from similar experience in everyday life that the emotion evolved is so modified as to be quite a different one, and further because the recovery from emotion

is not so quick and so complete as to make it possible to produce at one sitting as varied a set of emotions as we wish to evaluate.

The examiner states to the subject, "I am going to describe to you certain situations and I want you to think of yourself as experiencing each one and to tell me how you would feel and how you would act." The situations are then described one by one, ample time being allowed for thoughtful reply and conversation. The answers are recorded and the examiner judges whether any emotion, and if so, what emotion or emotions, the answer discloses. Very frequently a complex of emotion results and more frequently an emotion other than that expected.

One point is scored for each situation under the emotion expressed in the response, and if several emotions are expressed one-half a point is scored under each. If no emotion is evoked by the situation a dash is scored under the emotion most frequently called forth by that situation. The summing up of these points gives a differential score for each of the following emotions: fear, disgust, curiosity, anger, sociability, tenderness, self-esteem, and self-deprecation, and a total score for all emotional responses. In an individual record the scores attained under each emotion vary much one from another, and when placed in rank order indicate clearly which emotions of the group are most easily and habitually aroused. This rank order differs markedly in different individuals, and from a study of the scores of sixty-four persons so tested we believe is indicative of the individual emotional trends. The sum of the emotional responses in an individual score is indicative of the emotional responsiveness of the person tested. These scores also show great individual differences.

Neurotic Tendencies in Children: Criteria, Incidence and Differential Tests. WILLARD C. OLSON, University of Minnesota.

The report describes the development of a method for measuring nervous habits in children and the relation of nervous habits to certain etiological factors and differential tests.

The study is based upon the measurement of 33 children in the Institute of Child Welfare of the University of Minnesota and 700 children in the Minneapolis Public Schools.

A method of measuring nervous habits was devised which yields a quantitative score of determinable reliability for each child in a group. We have here the introduction of a unit of observational

measurement which should prove fruitful in several types of investigation.

The etiological factors studied were familial resemblance, neurotic family history, breast feeding, "imitation," habit, fatigue, and nutritional status. The incidence with respect to sex and age is described. The differential value of the Woodworth-Mathews Personal Data Sheet, the Pressey X-O Tests, the Haggerty Intelligence Examination, association tests, tapping tests, and tremor tests has been studied.

The research was conducted under a grant as Fellow of the National Research Council Board of Fellowships in the Biological Sciences (1926–27).

PROGRAM A

VOCATIONAL PSYCHOLOGY

FRIDAY, DECEMBER 30, 2:00 P.M.
COMMERCE AUDITORIUM
W. V. BINGHAM, *Chairman*

The Personal Analysis Bureau: A Venture in Rating and Testing Service. FORREST A. KINGSBURY, University of Chicago.

The Personal Analysis Bureau of Chicago represents an experiment in mental-test service on a commercial basis. A variety of well known tests, suitable for self-administration, are sent to clients at intervals in sealed envelopes bearing detailed instructions for taking the test. After these are taken, returned, and scored, the Bureau reports to the client his score and an interpretation, usually his percentile rating based on one or more comparable groups; and informs him as clearly as possible the probable significance, both theoretical and vocational, of various scores. Among the tests and ratings in the series are: Tests of general intelligence, mechanical aptitude, English aptitude and training, vocabulary, general and business information, extroversion-introversion tendencies, emotional tendencies, occupational interests, and other traits; ratings on twenty traits of social and occupational importance obtained confidentially from eight or ten friends and business associates whose names are supplied by the client, the general results of which are reported to him without disclosing the source of any individual rating; and personal criticisms of sample daily time schedule, a business letter, and an outline for a public address, prepared by the client. The service includes eight

small volumes on personal analysis and development, a personal inquiry privilege, and subscription to a monthly house journal, *Personal Development,* edited by Professor N. W. Barnes of the University of Chicago School of Commerce and Administration. This journal, which does not seek general circulation or advertising, contains articles by competent writers on aspects of personal and business efficiency of a substantial rather than an inspirational sort, and digests of similar articles from current personnel and psychological journals. Among the psychologists and educators who are associated with the Bureau in editorial or advisory capacities are Professors Barnes, H. D. Kitson, D. A. Laird, E. K. Strong, J. L. Stenquist, F. A. Russell, and others, besides the writer. Since last spring more than a thousand clients have subscribed for the service, most of them business executives, professional men, or men in responsible, near-executive positions. The plan seems not only to offer a type of service welcomed by many intelligent business men, but also promises to be a potential source of interesting personnel research material.

The Place of the Interview in Selection. SADIE MYERS SHELLOW, T. M. E. R. & L. Co., Milwaukee, Wisconsin.

Selection tests at best measure only the ability of an applicant. Habits of applying that ability, and motives which may stimulate the individual to develop it further, at present lie beyond the reach of objective measurement. "Personality tests" are still in the experimental stage. Because of the complicated and subtle nature of that combination of all traits called "personality" it will probably never be possible to obtain adequate measures by means of paper tests. To study personality one must go further than score answers to printed questions. The applicant must actually be observed in a social situation. The interview is essentially a social situation. Its richness as a source of information depends upon the cleverness and insight of the interviewer as well as the attitude of the applicant. The paper discusses the relationship between the interviewer and the applicant, the difference between a trained and an untrained interviewer, and between a formal and informal interview. Examples are given of the searching of a personality which is possible only in interview and thus far has never been duplicated by objective tests. The results of the interview must be subjected to as rigid a verification as the results of any test. While standardization of an interview would be con-

trary to its very nature, still its results can be recorded according to fixed forms which lend themselves as a basis for follow-up. Examples are given of follow-up forms designed to check the judgments arrived at in the course of the interview.

The Vocational Interest Test. EDWARD K. STRONG, JR., Stanford University.

Data indicate that each professional group has a characteristic set of interests that differentiate the group from other professional groups. Occupations that seemingly have little in common are clearly differentiated in this way; occupations that seemingly are closely allied are not separated so well.

A thoroughgoing revision of the interest blank has been made; more definite criteria have been established for success in a given occupation; the size of occupational groups to be studied has been increased; and the statistical methods of handling the data improved upon. It is expected that more significant results will be obtained from the approximately 5,000 records in our possession.

One of the most important problems of this research is the relationship between scores on the interest test in early life and the subsequent career of the individual. Records were obtained last year from two-thirds of the senior and graduate students at Stanford. Similar sets of records from other groups will be secured. But it will be several years before any definite answer can be obtained to this question. In the meantime norms will be established for various occupations, and the scores of large groups of both successful and unsuccessful men secured.

The Seashore Talent Tests as Administrative Aids. H. M. STANTON, Eastman School of Music.

This paper deals with the various uses of the Seashore Measures of Musical Talent. These measures of musical talent are psychological tests of certain capacities the degree of which is significant for the prognostication of musical achievement. Their extensive application has continued in the Eastman School of Music since this school was organized, six years ago. At the present time they are an integral part of the administrative functions of the school, in that they are factors in determining admissions and eliminations, awarding scholarships, grouping students for certain theoretical subjects, conferring with students, teachers and parents, and modifying the range of talent estimates made by teachers.

Social Background as a Basis for Predicting Academic Success. JOSEPH U. YARBOROUGH, Southern Methodist University.

The progress that a student makes in his school program depends to a large extent upon what is sometimes called the social condition of his family. Without any claim for a complete analysis of the social heritage of the student, we have studied some of the factors that are in his social background with the hope of determining whether or not they make for or against his success in college.

In this preliminary report we present the results from a study of 1,230 cases. The individual case studies were checked against scores made on the battery of tests prepared by the American Council on Education, and later, against college grades. The results indicate that some of the positive factors in the social background which make for success in college work are: (1) Education of the father and mother; (2) number of brothers and sisters; (3) economic certainty of family; (4) community in which the student receives his early training. The relative significance of each of these factors is indicated.

Measurement of Motor Skills (with moving picture demonstration). ROBERT H. SEASHORE, Stanford University.

Eight measures of sensori-motor coördination were given to fifty men under the cycle plan of testing. Six cycles of forty minutes each were divided into two groups of three cycles each, taking two hours on each of two days. These measures of muscular coördination are all of a serial or continuous nature. They are: Miles ataxiameter, Miles pursuitmeter, Koerth pursuitrotor, Seashore serial discrimination action, Miles pursuit pendulum, Miles speedrotor, and Brown spool packing. Each test is designed to be scored automatically by counter or output with time and accuracy controlled.

Full instructions tended to minimize the problem solving aspect and to emphasize the measurement of motor skills. Knowledge of scores was available at all times. Reliabilities and intercorrelations were calculated, and the unselected observers compared with highly trained athletes, typists, and musicians. Ratings on training in the above three fields were obtained from the group and compared with accomplishments on this battery. Thorndike scores and college grades were also correlated with scores on the motor battery.

A theoretical analysis of the rôle of neuromuscular factors and techniques in motor skills is presented. Six of the tests have been

arranged as a portable unit for work outside the laboratory. This portable unit is demonstrated in moving pictures, and uses and limitations of these techniques suggested.

Changes in Attitudes Resulting from a College Course in Economics. ARTHUR W. KORNHAUSER, University of Chicago.

College courses presumably affect students' attitudes as well as their fund of knowledge and it is as important to know what is happening in the one respect as in the other. The present paper reports an attempt to ascertain the changes in attitudes brought about by a year's survey course in economics at the University of Chicago. At the beginning and again at the end of the course each student was given a blank containing a series of ninety-four statements on controversial questions in economics, with instructions to indicate for each item whether he agreed, disagreed, or was undecided. The responses were analyzed and compared in a fashion indicated by the following summary of results.

The attitudes questionnaire given at the beginning of the year supplies an interesting cross-section of the students' feelings about various economic matters. The majority reaction is not alone significant; on almost every one of the ninety-four statements a minority group of respectable size exists. Considerable change of opinion is found between the beginning and the end of the year. The average number of reversed judgments per student (from "Agree" to "Disagree," or *vice versa*) is 18. On 38 of the 94 statements more than 10 per cent of the students change their opinions. It is of interest to note the particular matters with regard to which change occurs, and to relate these to the content of the course. The change in general is very slightly in the direction of greater liberalism or radicalism, fewer "undecided" responses, and greater degrees of individual "atypicality." Almost no change occurs in the size of minority groups on the individual questions, *i.e.*, the students in general become neither more uniform nor more diverse in their attitudes. Suggestive though not large differences are found between the sections taught by different instructors.

On the whole, extremely little relationship was found between the attitude scores of students and their standing in scholarship and on tests of intelligence and course content. This is due in part to the fact that the individual attitude scores are not very reliable, especially those for "atypicality" and radicalism. The inconsistency of these

scores probably reflects the highly specific nature of radical or atypical responses. Certain relationships do appear in the correlation analysis which are worth considering and following further.

Introversion as a Factor in the Vocational Selection of Teachers. L. A. PECHSTEIN, University of Cincinnati.

A two-hour battery of group tests and questionnaires, selected from the literature on personality measurement, was applied to 87 college sophomore girls, 32 women college graduates in their first year of student teaching (members of the fifth year group of the College of Education, University of Cincinnati), and 81 experienced women teachers. The battery yielded 14 indicators of introversion or extroversion. These indicators were questionnaire returns on social and economic background, score for commonality of response in the Kent-Rosanoff association test, amount of reported participation in social activities, a new measure of interest in social contacts (based upon likes and dislikes for certain logically selected items), and positive and negative attitudes (likes and dislikes) with reference to the following: occupations having major contacts with people, activities in which social contacts are important, activities in which social contacts are at a minimum, interest in manual work and mechanical matters, oral self-expression, managing people and leadership, conformity to social usage, susceptibility to social opinion, matters of sentiment and friendship. Only group differences of fair reliability (approximating at least three times the standard deviation of the difference) were considered.

General tendencies were noted for the student teachers to be more introverted than the sophomores, and for the teachers to be more introverted than the student teachers. Other comparisons within these major groups revealed that the older teachers tended to be more introverted than the younger teachers, the teachers with college degrees to be more introverted than the teachers without degrees, and the brighter teachers and sophomores (as measured by group mental tests) to be more introverted than the duller teachers and sophomores.

The psychological literature on introversion and extroversion points to a happy mean rather than to either extreme as most desirable for good personality adjustment. Lack of social adjustment and adaptability is especially undesirable in teachers, yet this study indicates a selective process whereby the more introverted women tend to get into teaching and to stay in it longer.

All of the subjects were unmarried. The hypothesis is suggested that introversion in a woman means lesser likelihood of marriage. The prospect of marriage keeps out of the profession many who might enter, and the call of marriage claims from the profession its less introverted members. A long-term study to check this hypothesis has been undertaken.

Defects of Symbolic Thinking with Special Reference to Reading. GRACE M. FERNALD, University of California at Los Angeles.

Three groups of subjects are included in this report. I. Non-readers who have not learned to recognize monosyllabic words after several years of school instruction. We have complete reports of sixteen such cases. Four subjects were unable to read or write their own names. II. Very poor, slow readers, both children and adults, who have been unable to make ordinary school progress in reading. We have completed a study of thirty-nine such cases in the Los Angeles schools. III. First grade children who have learned to read and write by methods adapted from those used with nonreaders.

The method, evolved after much experimentation, consisted in writing in large script, any word the subject suggested and letting him trace it with finger contact until he was able to write it without copying. After a few words had been learned in this way, he was encouraged to write stories, learning each word as needed. All words and stories were then printed. The subject read in print what he had written.

The negative attitude that had been established in connection with reading was disposed of by proving to the subject that he could learn. When some word recognition had been developed the subject was allowed to read anything that appealed to him, each word he failed to recognize being taught by the method described.

Results: (1) All cases in group I have developed normal reading ability for their ages in a period of a few months. The average progress was 24.8 months in 6.2 months. In most cases we have a product above the average in reading and writing ability and superior in mathematics. (2) Eighteen children (average I.Q. 107) in a special class averaged 3 years improvement in 7 months. In a second group, 21 children (average I.Q. 88) progressed an average of 15 months in 5 months. (3) All our cases of well-defined nonreaders have been males. Among poor readers males predominate. (4) Seven

of group I were left handed. (5) With first grade children we have had no failures, and after 5 years an average of 1½ years acceleration.

The experiment indicates that those who have difficulty in associating symbolic meaning with a printed or written word require more kinaesthetic experience than is necessary for the average. It is possible that our modern visual education is particularly unadapted to these cases.

Vocational guidance must take stock of these individual differences or cases such as we report will be kept out from the careers for which they are best fitted.

NOTES AND NEWS

On November 21, 1927, at the Psychology Laboratory of Stanford University, a dinner was held in commemoration of Dr. Frank Angell's 70th birthday, and of the 35th year since the founding of the Stanford Laboratory. Dr. Angell took this occasion to recount his Leipzig experience with the late Prof. E. B. Titchener and to describe incidents connected with the establishing of the Psychology departments both at Cornell and at Stanford. A portrait of Dr. Angell was unveiled and presented to the Psychology Laboratory at this time. The chairman of the occasion was Dr. Catharine Cox Miles.

Dr. W. V. Bingham, President of The Psychological Corporation and Director of the Personnel Research Federation, and Prof. J. P. Porter of Ohio University, were the only American psychologists in attendance at the Fourth International Conference of Technopsychology which was held in Paris October 10–14. Psychologists from twenty-one other countries were present. The largest delegations came from Germany, France, Russia, Poland and Czecho-Slovakia. Spain, Italy, Switzerland, Belgium, Holland and Denmark were also well represented. The program dealt largely with problems of employment psychology, researches on fatigue, monotony, causes of accidents, organization of work—or, as we would call it, scientific management—and educational and vocational guidance. Dr. Bingham was elected a member of the International Board of Directors of the Association and a second representative from the United States is to be appointed on nomination of American technopsychologists. Detailed reports of the meeting will be published in the *Journal of*

Applied Psychology and in the December number of the *Personnel Journal*. The Fifth International Conference will be held next year in Utrecht, at which time the scope of the program will be limited largely to three topics: the problem of educability, temperament and character, and causes of accidents.

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